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ARISTOTLE
PROBLEMS
BOOKS 1–19



Edited and Translated by
ROBERT MAYHEW

ARISTOTLE, great Greek philosopher, researcher, reasoner, and writer, born at Stagirus in 384 BC, was the son of Nicomachus, a physician, and Phaestis. He studied under Plato at Athens and taught there (367–347); subsequently he spent three years at the court of a former pupil, Hermias, in Asia Minor and at this time married Pythias, one of Hermias' relations. After some time at Mitylene, in 343–2 he was appointed by King Philip of Macedon to be tutor of his teen-aged son Alexander. After Philip's death in 336, Aristotle became head of his own school (of 'Peripatetics'), the Lyceum at Athens. Because of anti-Macedonian feeling there after Alexander's death in 323, he withdrew to Chalcis in Euboea, where he died in 322.

Nearly all the works Aristotle prepared for publication are lost; the priceless ones extant are lecture-materials, notes, and memoranda (some are spurious). They can be categorized as follows: I *Practical*: Nicomachean Ethics; Great Ethics (Magna Moralia); Eudemian Ethics; Politics; Economics (on the good of the family); On Virtues and Vices. II *Logical*: Categories; Analytics (Prior and Posterior); Interpretation; Refutations used by Sophists; Topica. III *Physical*: Twenty-six works (some suspect) including astronomy, generation and destruction, the senses, memory, sleep, dreams, life, facts about animals, etc. IV

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ARISTOTLE

PROBLEMS

BOOKS I-XXI

WITH AN ENGLISH TRANSLATION BY

W. S. HETT



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INTRODUCTION

THERE can be no doubt that Aristotle is not the author of the *Problems* as they have come down to us ; he is, however, known to have written a book of Problems, of which parts have clearly been incorporated in the present work, since Plutarch, Athenaeus, Galen, Apollonius, Cicero and Aulus Gellius all quote as Aristotelian problems found in our *Problems* ; for example, Book XXX. 1, the important problem dealing with the “ melancholic ” temperament, is vouched for as Aristotelian both by Plutarch and Cicero. The work as we have it was no doubt originally the product of the Peripatetic School, but may have been compiled at varying times and not have reached its present form until a date which some scholars place as late as the fifth century of our era. The oldest and the most important manuscript upon which the text is based dates from the tenth century.

Perhaps the most valuable aid to the translator is the Latin edition of Theodore Gaza (frequently referred to in the notes as Th. G.). Theodore Gaza was a Greek who lived between the years 1398 and 1478, and produced his Latin version of the *Problemata* in 1438, under the patronage of Pope Nicholas V., to whom it was dedicated. It seems quite certain that Theodore Gaza collated a number of manuscripts, some of which have not survived to our own time, and, as the reader will discover from the notes, he some-

INTRODUCTION

times has an intelligible Latin version, when the Greek of our text is untranslatable.

The reader will find the *Problemata* a work of very varying interest and value. At times the author shows the keenest powers of observation and hazards deductions which are astonishingly near the truth; at others the conclusions are childish and even inconsequent. Speaking generally, less interest will be felt in the solutions of the problems than in the amazingly wide field which they cover. No topic, however remote or however homely, is outside the scope of the work.

The form of the book suggests that it originated as a lecture notebook containing problems for discussion, to which additions were made by many hands at many times. This would account for the frequent repetitions and occasional contradictions.

Of all the books the most interesting and the most important is the XIXth, "Problems connected with Harmony." As this is one of the earliest discussions of the subject of Music which have come down to us, it deserves special consideration. Our understanding of Greek music is still far from complete and many questions are still subjects of controversy. There are, however, a number of well-established points upon which our notions of music and those of the Greeks differ so profoundly that the reader needs some preliminary knowledge of these differences if he is to enjoy the reading of the book. The layman's knowledge of music to-day is unfortunately distorted by familiarity with the piano. This instrument, admitting as it does only differences of a semitone, is a distinct bar to any true appreciation of Greek music.

We have also inherited from early Church music the

INTRODUCTION

idea that there are only two normal scales in the octave—the major and the minor. Greek music offered a far greater variety. Not only did the Greek scale admit of other sequences of notes than those represented by our scales, but as their instruments were all either wind or string instruments, quarter tones were not only allowed but were regularly played. These two facts clearly added very greatly to the possible variations of a scale within the octave. The normal Greek octave contained twenty-one notes instead of the twelve of the tempered scale. Some have supposed that a semitone is the smallest interval which the Western ear can detect, but this is most improbable. There seems no reason to believe that the Greek ear was more sensitive than our own, except in so far as it was trained to appreciate the smaller interval.

The next point of great interest is that the Greeks appear to have recognized only three concords—the fifth, the fourth and the octave. It may surprise a modern musician to know that the third was considered a discord.

According to the late Mr. Cecil Torr (*Oxford History of Music*, p. 27), concords were usually, though not always, produced by sounding the two notes in succession and not simultaneously. When the voice or voices were accompanied by an instrument, the instrument sounded a note a fifth above or below the voice. So in the event of two voices singing an octave apart the accompaniment would give both a fourth and a fifth.

There is very little ancient Greek music in existence, but we have three incomplete hymns on stone and three even less complete in manuscript.

INTRODUCTION

The Greeks were much more impressed than we are by the moral effects of music. Plato regarded this as so important that in the *Republic* he lays down precisely what music is inadmissible in his ideal state. It is possible that to-day, when mechanical music is so universal that it forms part of the daily life of all or nearly all the population, it is time for us to consider anew the psychological effects of different types of music.

To the other books no special introduction is necessary. The reader will be interested in some ingenious mathematical speculations in Book XV.; Book VII., "On Sympathy," and Book XVIII., "On Studiousness," will also repay careful reading. The text used for this edition is that of C. A. Ruelle edited by Hermann Knoellinger and Joseph Klek. Our grateful thanks are due to Messrs. B. G. Teubner of Leipzig for permission to use this edition. Departures from Ruelle's readings are given in the notes. Emendations by W. D. Ross, E. S. Forster and H. Richards are also noted as they occur.

W. S. HETT

ABBREVIATIONS USED IN THE APPARATUS CRITICUS

Ya	Codex Parisinus 2036.
A ^p	Codex Bibliothecae Nationalis 1865.
X ^a	Codex Vaticanus 1283.
C ^a	Codex Laurentianus 87. 4.
Th. G.	Theodori Gazae Versio Latina.

THE TRADITIONAL ORDER of the works of Aristotle as they appear since the edition of Immanuel Bekker (Berlin, 1831), and their division into volumes in this edition.

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ARISTOTLE'S
PHYSICAL PROBLEMS

ΑΡΙΣΤΟΤΕΛΟΥΣ
ΦΥΣΙΚΑ ΠΡΟΒΛΗΜΑΤΑ
ΚΑΤ' ΕΙΔΟΣ ΣΥΝΑΓΩΓΗΣ

Α

ΟΣΑ ΙΑΤΡΙΚΑ

859 a

Διὰ τί αἱ μεγάλαι ὑπερβολαὶ νοσώδεις; ἢ ὅτι 1
ὑπερβολὴν ἢ ἔλλειψιν ποιούσιν; τοῦτο δὲ ἦν ἡ
νόσος.

Διὰ τί δὲ τὰς νόσους πολλάκις ὑγιάζουσιν, ὅταν 2
5 πολὺ ἐκστῆ τις; καὶ ἐνίων ἰατρῶν τοιαύτη ἡ
τέχνη· ὑπερβολαῖς γὰρ ἰῶνται οἴνου ἢ ὕδατος ἢ
ἄλμης ἢ σίτου ἢ λιμοῦ. ἢ ὅτι ἐναντία ἀλλήλοις
τὰ τὴν νόσον ποιούντα; εἰς τὸ μέσον οὖν ἄγει
θάτερον ἑκάτερα.

Διὰ τί αἱ τῶν ὥρων μεταβολαὶ καὶ πνεύματα 3
10 ἐπιτείνουσιν ἢ παύουσι καὶ κρίνουσι τὰς νόσους
καὶ ποιούσιν; ἢ ὅτι θερμαὶ καὶ ψυχραὶ εἰσι καὶ
ὑγραὶ καὶ ξηραὶ, αἱ δὲ νόσοι τούτων εἰσὶν ὑπερβολαί,
ἢ δὲ ὑγεία ἰσότης; ἐὰν οὖν δι' ὑγρότητα ἢ ψύξιν,
ἢ ἐναντία ὥρα παύει· ἐὰν δὲ ἐναντία ὥρα ἔχεται,
ἢ ὁμοία κράσις ἐπιγενομένη ἐπέτεινεν καὶ ἀνεῖλεν.

ARISTOTLE'S
PHYSICAL PROBLEMS
ARRANGED ACCORDING TO THEIR
CONTENTS

BOOK I

PROBLEMS CONNECTED WITH MEDICINE

WHY do great excesses cause disease? Is it because 1 they produce either excess or defect? And after all these constitute disease.

But why do they often cure diseases by making the 2 patient indulge in some form of excess? Actually the treatment of some physicians consists of this; for they heal diseases by excess of wine, water, salt, food or starvation. Is it because the causes of disease are the opposites of one another? Consequently each excess or defect reduces the other to the mean.

Why do changes of season and winds intensify 3 or check, determine and produce diseases? Is it because seasons are hot and cold, wet and dry, but diseases are excesses of these things, while health is the balance of them? If, then, the disease is due to damp or cold, the contrary season checks it. But if a season of the opposite kind follows, the addition to the disease of a mixture of similar qualities aggravates

ARISTOTLE

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 15 διὰ ταῦτα δὲ καὶ νοσίζουσι τοὺς ὑγιαίνοντας, ὅτι μεταβάλλουσαι λύουσι τὴν κρᾶσιν· ἅμα γὰρ ταῖς οἰκείαις ὥραις καὶ ἡλικίαις καὶ τόποις αὐξάνεται. διὸ δεῖ ἐν ταῖς μεταβολαῖς μάλιστα διακυβερνᾶν. ὁ δὲ καθόλου περὶ τῶν ὥρῶν εἴρηται, καὶ κατὰ μέρος τὸ αὐτὸ αἴτιον. αἶ γὰρ τῶν πνευμάτων
 20 μεταβολαὶ καὶ τῶν ἡλικιῶν καὶ τόπων ὥρας τινός εἰσι μεταβολαί. διὸ καὶ ταῦτα ἐπιτείνει καὶ παύει καὶ κρίνει καὶ ποιεῖ, ὥσπερ αἶ ὥραι καὶ ἐπιτολαὶ τῶν ἄστρον, ὥσπερ Ὁρίων καὶ Ἀρκτοῦρος καὶ Πλειὰς καὶ Κύων, [ὥσπερ] πνευμάτων καὶ ὑδάτων καὶ εὐδιῶν καὶ χειμώνων καὶ ἀλέας.

25 Διὰ τί ἐν ταῖς μεταβολαῖς τῶν ὥρῶν ἐμέτοις 4 οὐ δεῖ χρῆσθαι; ἢ ἵνα μὴ γένηται συντάραξις διαφορῶν γινομένων τῶν περιττωμάτων διὰ τὰς μεταβολάς;

859 b Διὰ τί καὶ οἱ κιβδηλιῶντες καὶ οἱ ὑπὸ λιμοῦ 5 πονοῦντες τοὺς πόδας οἰδοῦσιν; ἢ διὰ τὴν σύντηξιν ἀμφότεροι; συντήκονται δὲ οἱ μὲν διὰ λιμὸν διὰ τὸ ὅλως μὴ λαμβάνειν τροφήν, οἱ δὲ κιβδηλιῶντες διὰ τὸ μηδὲν ἀπολαύειν ἧς λαμβάνουσι τροφῆς.

5 Διὰ τί τῶν ἀπὸ χολῆς νοσημάτων <ὄντων>¹ ἐν τῷ 6 θέρει (πυρέττουσι γὰρ μάλιστα ἐν τῷ θέρει) τὰ ὀξέα ἀπὸ χολῆς ὄντα ἐν τῷ χειμῶνι γίνεται μᾶλλον; ἢ διότι μετὰ πυρετοῦ ὄντα ὀξέα ἐστὶν διὰ τὸ βίαια εἶναι, ἢ δὲ βία παρὰ φύσιν; ὑγραιομένων γάρ
 10 τινων τόπων θερμὴ φλεγμασία γίνεται· ἢ δὲ φλεγμασία ὑπερβολὴ θερμότητος οὕσα ποιεῖ τοὺς πυρετούς. ἐν μὲν οὖν τῷ θέρει ξηραὶ καὶ θερμαί εἰσιν αἶ νόσοι, ἐν δὲ τῷ χειμῶνι ὑγραὶ καὶ

¹ <ὄντων> added by Forster from Th. G.

PROBLEMS, I. 3-6

it and produces death. This is why such seasons also make the healthy ill, because by changing they disturb the mixture; at the same time health is improved by suitable seasons, ages and places. Hence at such changeable seasons special care is needed in steering one's course. What I have already said about the seasons in general applies as a cause to particular cases. For changes of wind, ages and places are in a sense changes of season. These things, therefore, intensify and check, determine and produce diseases, just as seasons and the rising of constellations do, such as Orion, Arcturus, Pleias and the Dog-star, (which are also the causes of)^a winds and rain, fine weather, storms and warmth.

Why should the use of emetics be avoided at the 4 time of the changes of the seasons? Is it that there may be no disturbance at the time when the excretions are varying because of these changes?

Why should both those with jaundice and those 5 suffering from starvation have swollen feet? Are both due to wastage? The starving waste because they receive no food at all, the jaundiced because they derive no benefit from the food they take.

Why is it that although bilious ailments occur in 6 the summer (for fevers are commoner in the summer) acute bilious attacks are more frequent in the winter? Is it because, being associated with fever, they are acute, because they are violent, and violence is contrary to nature? For acute inflammation occurs when certain parts are moist, and inflammation, being an excess of heat, produces fevers. In the summer, then, diseases are dry and hot, and in the winter moist and hot, and consequently acute. For

^a From the Latin translation of Th. G.

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θερμαί, διὸ ὀξεῖαι· ταχέως γὰρ ἀναιροῦσιν· οὐ γὰρ θέλει πέττεσθαι διὰ τὸ πλῆθος τοῦ περιττώματος.

15 Διὰ τί ποτε ὁ λοιμὸς μόνη τῶν νόσων μάλιστα 7 τοὺς πλησιάζοντας τοῖς θεραπευομένοις προσαναπίμπλησιν; ἢ ὅτι μόνη τῶν νόσων κοινή ἐστὶν ἅπασιν, ὥστε διὰ τοῦτο πᾶσιν ἐπιφέρει τὸν λοιμόν, ὅσοι φαύλως ἔχοντες προϋπάρχουσιν; καὶ γὰρ διὰ τὸ ὑπέκκαυμα τῆς νόσου τῆς παρὰ τῶν
20 θεραπευομένων γινομένης ταχέως ὑπὸ τοῦ πράγματος ἀλίσκονται.

Διὰ τί τοῦ χειμῶνος βορείου γενομένου, εἰὰν τὸ 8 ἔαρ ἔπομβρον γένηται καὶ νότιον, τὸ θέρος νοσῶδες γίνεται πυρετοῖς καὶ ὀφθαλμίαις; ἢ ὅτι τὰ τε σώματα ἐκδέχεται τὸ θέρος πολλὴν ἔχοντα ἀλ-
25 λοτρίαν ὑγρότητα, καὶ ἡ γῆ καὶ ὁ τόπος ἐν ᾧ ἂν οἰκῶσι, γίνεται ἔφυδρος καὶ τοιοῦτος οἶοι λέγονται οἱ αἰεὶ νοσῶδεις τόποι; πρῶτον μὲν οὖν ὀφθαλμίαι γίνονται τηκομένης τῆς περὶ τὴν κεφαλὴν περιτ-
880 a τώσεως, ἔπειτα πυρετοί. δεῖ γὰρ νοῆσαι ὅτι τὸ αὐτὸ καὶ θερμότατον γίνεται καὶ ψυχρότατον, οἶον ὕδωρ καὶ λίθος ὁ μὲν ζεῖ, τὸ δὲ κάει μᾶλλον. ἐν τε οὖν ἀέρι πνίγη γίνεται θερμαινομένου τοῦ ἀέρος διὰ πάχος, καὶ ἐν τοῖς σώμασιν ὡσαύτως πνίγη
6 καὶ καύματα, τὸ δὲ ἐν σώματι καῦμα πυρετός ἐστίν, ἐν δὲ ὀφθαλμοῖς ὀφθαλμία. ὅλως δὲ καὶ ἡ μεταβολὴ ἰσχυρὰ οὔσα τὰ σώματα φθείρει, ὅταν τοῦ ἔαρος ὑγροῦ ὄντος εὐθὺς ἐπιλαμβάνη τὸ θέρος θερμὸν ὄν καὶ ξηρόν. ἔτι δὲ χαλεπώτερον, εἰὰν καὶ τὸ θέρος ἔπομβρον γένηται. ἔχει γὰρ ὁ ἥλιος
10 ὕλην ἣν ποιήσει ζεῖν καὶ ἐν τοῖς σώμασιν καὶ ἐν τῇ γῇ καὶ ἀέρι· διὸ γίνονται πυρετοὶ καὶ ὀφθαλμίαι.

PROBLEMS, I. 6-8

they quickly cause death, because they will not admit of concoction owing to the excess of waste products.

Why is the plague the only disease which readily 7 infects those who come near to patients? Is it because it is the only disease which is common to all mankind, so that for this reason it readily communicates the plague to all those who are in poor health to begin with? For, owing to the inflammation arising from those who are suffering from the disease, men are quickly attacked by it.

Why is it that when the winter wind has been 8 northerly, if the spring has been rainy and wet, the summer is always unhealthy with fevers and disease of the eyes? Is it because the summer comes to bodies which contain much foreign moisture, and because the soil and any place in which men live becomes waterlogged and of the kind described as permanently unhealthy? First of all eye disease occurs when the waste products about the head melt, and then fevers follow. It is important to realize that the same substance admits of the greatest heat and the greatest cold; for instance water and stone, of which the former boils and the latter burns more (than other things). So, then, in the air when it grows hot the stifling heat is due to its density, and similarly in bodies there is stifling and heat, and heat in the body is fever, and in the eyes is eye-disease. Speaking generally, change, if violent, destroys bodies, when a hot and dry summer follows closely on a spring which has been wet. But it is more dangerous still, if the summer is also rainy. For then the sun finds matter which it will cause to boil both in bodies and in the earth and air; from this arise both fevers and diseases of the eyes.

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Διὰ τί, ἔαν ὁ χειμῶν νότιος γένηται καὶ ἔπομβρος, ὃ
 τὸ δὲ ἔαρ αὐχμηρὸν καὶ βόρειον, νοσῶδες γίνεται
 καὶ τὸ ἔαρ καὶ τὸ θέρος; ἢ ὅτι ἐν μὲν τῷ χειμῶνι
 15 διὰ τὴν ἀλέαν καὶ ὑγρότητα ὁμοίως τὰ σώματα
 διάκειται τῇ ὥρᾳ; ὑγρὰ γὰρ ἀνάγκη εἶναι καὶ οὐ
 συνεστηκότα. οὕτω δὲ ἐχόντων, τὸ ἔαρ ψυχρὸν
 ὄν ἐπηξεν καὶ ἐσκλήρυνεν αὐτὰ διὰ τὸν αὐχμὸν,
 ὥστε ταῖς μὲν κούσαις ὁ τόκος ὁ ἔαρινος εἰς
 ἐκτρώσεις γίνεται διὰ τὴν θερμασίαν καὶ τὸν
 20 σφακελισμὸν τὸν γινόμενον ὑπὸ τῆς ξηρᾶς ψυχρό-
 τητος, ἅτε οὐκ ἐκκρिनόμενης τῆς ὑγρότητος, τὰ
 δὲ κύομενα παιδιά ἀσθενῆ γίνεται καὶ πηρὰ διὰ
 τὴν ὑπερβολὴν τοῦ ψύχους· συμβέβηκε γὰρ τότε
 γεννώμενα ἐν εὐδία καὶ συστήναι καὶ τραφῆναι ἐν
 τῇ τεκούσῃ. τοῖς δὲ ἄλλοις, ἅτε ἐν τῷ ἔαρι οὐκ
 25 ἀποκαθαρθέντος τοῦ φλέγματος (διὰ) τὴν ὑπερ-
 βολὴν, ὃ συμβαίνει ὅταν ἀλεινὸν γένηται, ἀλλὰ
 διὰ ψῦχος συστάντος, ὅταν ἐπιλάβῃ τὸ θέρος καὶ
 ἢ ἀλέα τήκουσα βία, τοῖς μὲν χολώδεσι καὶ ξηροῖς,
 διὰ τὸ μὴ διερὰ εἶναι τὰ σώματα αὐτοῖς, ἀλλὰ τὴν
 φύσιν αὐτὸν ἔχειν, γίνονται μὲν ὑγρότητες, αὐταὶ δὲ
 30 λεπταί, ὥστε ὀφθαλμίαις ξηραῖς ἀλίσκονται. οἱ
 δὲ φλεγματώδεις βράγχοις καὶ εἰς τὸν πνεύμονα
 κατάρροις. ταῖς γυναιξὶ δὲ δυσεντερίαι γίνονται
 διὰ τὴν ὑγρότητα καὶ ψυχρότητα τῆς φύσεως, τοῖς
 δὲ γεραιτέροις ἀποπληξίαι, ὅταν ἀθρόον λυθὲν
 ὑγρὸν ἐπιπέσῃ καὶ δι' ἀσθένειαν τοῦ συμφύτου
 θερμοῦ παγῆ.

35 Διὰ τί, ἔαν μὲν τὸ θέρος αὐχμηρὸν γένηται 10
 καὶ βόρειον, τὸ δὲ μετόπωρον ἐναντίον, ὑγρὸν καὶ
 νότιον, ἐν τῷ χειμῶνι κεφαλαγίαι τε γίνονται καὶ
 860 b βράγχοι καὶ βῆχες, καὶ τελευτῶσιν εἰς φθίσεις;

PROBLEMS, I. 9-10

Why is it that, if the winter has been wet and rainy, 9 and the spring dry with a northerly wind, both summer and spring are unhealthy? Is it because in winter, owing to warmth and moisture, bodies are adjusted to the season? For they must be moist and not firmly compacted. In these conditions the spring being cold compacts and hardens the bodies owing to its dryness. Hence with pregnant women birth in the spring tends to produce miscarriage owing to the heat and spasms due to the dry cold, because the moisture is not secreted and the embryo becomes weak and shrivelled owing to excess of cold: for children born at this time in fine weather are well-knit and nourished in the mother. But in the case of others in spring the phlegm is not cleared away owing to its excess (as happens when the weather is warm) but congeals owing to the cold. Then when summer comes and the warmth forcibly melts the phlegm, those who are bilious and dry suffer from humours, because their bodies are not wet but by nature dry. The humours which are there, however, are slight, so that they only suffer from "dry" ophthalmia. But those who by nature secrete much phlegm suffer from sore throat and a catarrh of the lungs. Dysentery is common among women owing to the moisture and coldness of their nature, and apoplexy occurs among the elderly, when the collected moisture is released and descends, and is congealed owing to the weakness of their natural heat.

Why is it that, if the summer has been dry with a 10 north wind, and the autumn on the other hand damp and rainy, headaches, sore throats and coughs occur in the winter and end in consumption? Is it because

860 b

ἢ ὅτι λαμβάνει ὕλην πολλήν ὁ χειμών, ὥστ' αὐτῷ ἔργον ἐστὶ πῆξαι τὴν ὑγρότητα καὶ φλέγμα ποιῆσαι; ἐν μὲν οὖν ταῖς κεφαλαῖς, ὅταν ὑγρασία γένηται, βάρη ποιεῖ, ἐὰν δὲ ἡ πολλὴ καὶ ψυχρά, σφακελισμούς· ἐὰν δὲ διὰ πλῆθος μὴ πῆξῃ, ῥεῖ εἰς τὸν ἐχόμενον τόπον, ὅθεν αἱ βῆχες καὶ οἱ βράγχοι καὶ αἱ φθόαι γίνονται.

Διὰ τί δέ, ἐὰν βόρειον γένηται τὸ θέρος καὶ αὐχμῶδες, καὶ τὸ μετόπωρον, συμφέρει τοῖς φλεγματώδεσι καὶ ταῖς γυναιξίν; ἢ ὅτι ἡ φύσις ἐπὶ θάτερα ἀμφοῖν ὑπερβάλλει, ὥστε εἰς τοῦναντίον ἡ ὥρα ἐλκύσασα καθίστησιν εἰς τὴν εὐκρασίαν; καὶ παραχρῆμά τε ὑγιαίνουσιν, ἐὰν μὴ τι δι' ἑαυτοὺς ἀμαρτάνωσι, καὶ εἰς τὸν χειμῶνα οὐχ ὑγροὶ ἀφικνοῦνται, ἔχοντες ὑπεκκαύματα τῷ ψύχει.

Διὰ τί τοῖς χολώδεσι νοσῶδές ἐστὶ τὸ βόρειον καὶ αὐχμῶδες θέρος καὶ μετόπωρον; ἢ ὅτι ἐπὶ ταῦτόν ῥέπει αὐτοῖς τὸ σῶμα καὶ αἱ ὥραι, ὥστε ὥσπερ πῦρ ἐπὶ πυρὶ γίνεται; ξηραινομένων γὰρ τῶν σωμάτων, καὶ τοῦ γλυκυτάτου μὲν ἐξικμαζομένου ἐξ αὐτῶν, ὑπερθερμαινομένων δὲ λίαν, ἀνάγκη διὰ μὲν τὰς συμπήξεις¹ ὀφθαλμίας ξηρὰς γίνεσθαι, διὰ δὲ τὸ χολώδεις² τοὺς ὑπολειπομένους εἶναι χυμούς, ὑπερθερμαινομένων δὲ καὶ τούτων πυρετοὺς ὀξεῖς γίνεσθαι ἅτε ὑπ' ἀκράτου τῆς χολῆς, ἐνίοις δὲ μανίας, οἷς ἂν μέλαινα χολὴ φύσει ἐνῆ· αὕτη γὰρ ἐπιπολάζει ἀναξηραινομένων τῶν ἐναντίων χυμῶν.

Διὰ τί τὸ τὰ ὕδατα μεταβάλλειν νοσῶδές φασιν εἶναι, τὸ δὲ τὸν ἀέρα οὐ; ἢ ὅτι τοῦτο γίνεται τροφή, καὶ ἔχοντες καὶ ἀπολελαυκότες τοῦ ὕδατος

¹ συμπήξεις Forster from Th. G.: συντήξεις Ruelle.

² χολώδεις Forster: χολῶδες Ruelle.

PROBLEMS, I. 10-13

the winter finds matter in considerable quantity, so that it is a hard task to congeal the moisture and form phlegm? Therefore, in the head, moisture when it appears causes heaviness, and if it is in large quantity and cold, convulsions; but if, owing to the quantity, the winter cannot congeal the moisture, it flows into the neighbouring place, whence coughs, sore throats and consumption arise.

Why is it that, if both summer and autumn are dry 11 with a northerly wind, those who are phlegmatic and women benefit? Is it because the nature of both shows excess in the one direction, so that the season, pulling the opposite way, restores the balance? They are healthy at the moment, unless they have committed some error of their own, and they do not reach the winter moist, because they have heat as a preventive to cold.

Why is a dry summer and autumn when north 12 winds prevail liable to produce disease among the bilious? Is it because their body and the seasons are both inclining in the same direction, so that it becomes, as it were, fire added to fire? For as the bodies grow dry, and the sweetest part is evaporated out of them, they grow excessively hot. Consequently because of the solidification dry ophthalmia must arise, and because the remaining humours are bilious, when these are over-heated, acute fevers occur because of the unmixed bile, and in some cases madness, when black bile is naturally present, for this comes to the surface as the opposite humours dry up.

Why do they say that change of water produces 13 disease, but that change of air does not? Is it because water is a form of sustenance, and men take and enjoy water and then have done with it, but they never

860 b

ἀπέρχονται, τοῦ δὲ ἀέρος οὐδέν; ἔτι ὕδατος μὲν
 30 πολλὰ εἶδη ἐστὶν καὶ διαφοραὶ καθ' αὐτά, ἀέρος
 δὲ οὐ, ὥστε καὶ τοῦτο αἴτιον· ἐν μὲν γὰρ τῷ ἀέρι
 σχεδὸν τῷ αὐτῷ συμβαίνει διατελεῖν καὶ ἀπο-
 δημοῦντας, ἐν δὲ ὕδασι ἄλλοις· διὸ καλῶς δοκεῖ
 νοσώδης ἢ τοῦ ὕδατος μεταβολὴ εἶναι.

Διὰ τί μᾶλλον ἢ τοῦ ὕδατος ἢ ἢ τῶν σιτίων μετα- 14
 35 βολὴ νοσώδης; ἢ ὅτι πλείστον ἀναλίσκομεν τὸ
 ὕδωρ; ἐν τε γὰρ τοῖς σιτίοις ὑπάρχει καὶ ὄψοις,
 καὶ ἐν τῷ πόματι τὸ πλείστον ὕδωρ.

881 a

Διὰ τί δὲ ἢ μεταβολὴ νοσώδης; ἢ ὅτι πᾶσα μὲν 15
 ἢ μεταβολὴ καὶ ὥρας καὶ ἡλικίας εὐκίνητον;
 εὐκίνητα γὰρ τὰ ἄκρα, οἷον καὶ αἱ ἀρχαὶ καὶ αἱ
 τελευταί. ὥστε καὶ αἱ τροφαὶ ἕτεραι οὔσαι ἀλ-
 5 λήλας φθείρουσιν· αἱ μὲν γὰρ ἄρτι, αἱ δὲ οὔπω
 προσπεφύκασιν. ἔτι δὲ ὥσπερ ἢ ποικίλη τροφή
 νοσώδης (ταραχώδης γὰρ καὶ οὐ μία πέψις), οὕτω
 συμβαίνει μεταβάλλουσιν ὕδωρ ποικίλη πόματος
 χρῆσθαι τῇ τροφῇ· καὶ ἢ τοιαύτη τροφή κυριωτέρα
 τῆς ξηρᾶς ἐστὶ τῷ πλείστον εἶναι καὶ ἐξ αὐτῶν
 τῶν σιτίων τὸ ὑγρὸν γίνεσθαι τροφήν.

10 Διὰ τί ἢ τῶν ὑδάτων μεταβολὴ τοῖς ἔχουσι 16
 φθείρας ποιεῖ πολλοὺς ἔχειν; ἢ ὅτι ἀπειψία γινο-
 μένη τοῦ ὑγροῦ διὰ τὴν ταραχήν, ἢ γίνεται διὰ τὴν
 ποικιλίαν τοῦ ὕδατος πυκνὰ μεταβάλλουσιν, ὑγρό-
 τητα ἐμποιεῖ, καὶ μάλιστα ἐν τῷ ἐπιτηδείως
 ὑπάρχοντι τόπῳ; ὁ δὲ ἐγκέφαλος ὑγρός· διὸ καὶ
 15 ἢ κεφαλὴ αἰεὶ μάλιστα. δηλοῖ δέ, ὅτι αἱ τρίχες
 ἐνεῖσι μάλιστα ἐν αὐτῇ. ἢ δὲ τοῦ τόπου τούτου
 ὑγρότης φθειρῶν ποιητικὴ. δηλοῖ δὲ ἐπὶ τῶν

PROBLEMS, I. 13-16

have done with the air? Also there are many forms of water, with differences between them, but there is no difference in air, so that this also may be the reason; for it is our fate to spend our lives, even when we leave home, in much the same air, but with quite different water; hence it is right to regard change of water as productive of disease.

Why is change of water more liable to produce 14 disease than change of food? Is it because we consume water most? For there is water in all food and even in cooked food, and in drinks there is more water than anything else.

But why is change unhealthy at all? Is it because 15 all change both of season and of age is liable to disturbance? Extremes are always liable to disturbance, such as all beginnings and ends, so that the forms of nourishment being different corrupt each other. For some have only recently come, and some have not come yet. Again, just as a varied diet produces disease (for digestion is then complicated and not simple), so also those who change their water are employing a varied diet of drink. Such a diet has even more influence than if it is dry, both because it is great in quantity and because the moisture from cereal food itself also acts as diet.

Why does a change of water cause lice to increase 16 on those who have them? Is it because there is a failure to digest the moisture owing to the disturbance produced, which is due to the variation with those who change their water frequently? This produces moisture, especially in the region most liable to it. Now the brain is moist; consequently the head is always most moist. This is obvious from the fact that most hair grows there. The dampness of this region is most liable to produce lice. This is clear in the case

861 a

παίδων· ὑγροκέφαλοί τε γάρ εἰσιν καὶ πολλάκις ἢ κορυζῶσιν ἢ αἶμα ποιεῖ ρεῖν, καὶ φθειρας πλείους οἱ ἐν ταύτῃ τῇ ἡλικίᾳ ἔχουσιν.

20 Διὰ τί ἀπὸ Πλειάδος μέχρι ζεφύρου οἱ τὰς 17 μακρὰς νόσους κάμνοντες μάλιστα ἀναιροῦνται, καὶ οἱ γέροντες μᾶλλον τῶν νέων; πότερον ὅτι δύο ἐστὶ τὰ φθαρτικώτατα, ὑπερβολή τε καὶ ψῦχος; τὸ γὰρ ζῆν θερμόν, ἢ δὲ ὥρα αὕτη ἄμφω ταῦτ' 25 ἔχει· ψυχρά τε γάρ ἐστι, καὶ ἀκμαιότατος ὁ χειμῶν· τὸ λοιπὸν γὰρ ἔαρ ἐστίν. ἢ ὅτι ὁμοίως μὲν διάκεινται τοῖς γέρουσι τῶν καμνόντων οἱ τὰς μακρὰς κάμνοντες ἀσθενείας; οἷον γὰρ ἤδη γῆρας ἢ μακρὰ ἀσθένεια συμβαίνει· τὸ γὰρ σῶμα ἀμφοῖν ξηρὸν καὶ ψυχρόν ἐστιν, τῶν μὲν δι' ἡλικίαν, τῶν 30 δὲ διὰ νόσον. ὁ δὲ χειμῶν καὶ οἱ πάγοι ὑπερβολή ἐστι ψυχρότητος καὶ ξηρότητος. μικρὰς οὖν δεομένοισι αὐτοῖς ῥοπῆς γίνεται οἷον πῦρ ἐπὶ πυρὶ ὁ χειμῶν, καὶ φθείρει διὰ ταῦτα.

Διὰ τί ἐν τοῖς ἐλώδεσι τὰ μὲν ἐν τῇ κεφαλῇ ἔλκη 18 ταχὺ ὑγιάζεται, τὰ δὲ ἐν ταῖς κνήμαις μόλις; ἢ ὅτι 35 βαρεῖα ἢ ὑγρότης διὰ τὸ γεώδης εἶναι, τὰ δὲ βαρέα εἰς τὸ κάτω ἀποχωρεῖ; τὰ μὲν οὖν ἄνω ἔκκριτα διὰ τὸ ἀποκεχωρηκέναι εἰς τὰ κάτω, τὰ δὲ κάτω πολλῆς γέμει περιπτώσεως καὶ εὐσήπτου.

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Διὰ τί, εἰάν τοῦ χειμῶνος γενομένου βορείου καὶ 19 τοῦ ἔαρος νοτίου καὶ ἐπόμεβρου τὸ θέρος λίαν αὐχμηρὸν γένηται, θανατῶδες γίνεται τὸ μετ-όπωρον πᾶσιν, μάλιστα δὲ τοῖς παιδίοις, καὶ τοῖς 5 ἄλλοις δὲ δυσεντερίαί καὶ τεταρταῖοι χρόνιοι γίνονται ἐν αὐτῷ; ἢ ὅτι μετρίου μὲν ἐπιγενομένου ὕδατος θερινοῦ καταψυχθὲν τὸ ζέον ὑγρὸν ἐν ἡμῖν λωφᾶ, ὅσον ἠθροίσθη ἐν τῷ ἡρι γενομένῳ τῷ

PROBLEMS, I. 16-19

of children, for they are often moist-headed and most liable to discharge from the nose and flow of blood, and it is at this age that lice are commonest.

Why is it that those who suffer from disease of long 17 standing most often die between the rising of the Pleiads and the coming of the west wind, and the old more than the young? Is it because there are two causes of death, excess and cold? For living implies heat, and this season shows both these qualities. For it is cold and winter is at its height, for the next season is the spring. Or is it because those who suffer from diseases of long standing are in a condition similar to the old? For a long-standing illness is a kind of old age. For in both cases the body is dry and cold, in the latter because of age, in the former from disease. But winter and frost imply an excess of cold and dryness. Consequently, as they require very little to upset the balance, winter acts as if fire were added to fire and so it destroys them.

Why is it that in marshy districts wounds in the 18 head heal quickly, but those in the legs slowly? Is it because moisture is heavy because its nature is earthy, and what is heavy tends to sink? Hence the upper parts are soon cleared out because the moisture sinks downwards, but the lower parts are full of waste product, which readily putrefies.

Why is it that, if, after a winter in which the north 19 wind prevails and a wet and rainy spring, the summer is unusually dry, the autumn is deadly to all and especially to children, while others suffer from dysentery and prolonged quartan fevers at this time? Is it because after a moderate summer rainfall the boiling moisture within us, which was all collected during the wet spring, grows cool and becomes

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ὑγρῶ; εἰ δὲ μή, τὰ μὲν παῖδια διὰ τὸ ὑγρὰ φύσει
 καὶ θερμὰ εἶναι ὑπερζει τῷ πάθει, διὰ τὸ μὴ κατα-
 10 ψυχθῆναι. ὅσα δὲ μὴ τοῦ θέρους, τοῦ μετοπώρου
 [ὅσον]¹ ἐκζει. αἱ δὲ περιπτώσεις εἰ μὴ εὐθὺς
 ἀνέλωσι, περὶ πνεύμονα καὶ ἀρτηρίαν γινόμεναι—
 ἄνω γὰρ πρῶται συνίστανται διὰ τὸ ὑπὸ τοῦ ἀέρος
 ἡμᾶς θερμαίνεσθαι· διὰ γὰρ ταῦτα καὶ ὀφθαλμῖαι
 πυρετῶν πρότερον γίνονται ἐν τῷ νοσερῶ θέρει.—
 15 εἰ μὴ οὖν ἐν τοῖς ἄνω, καθάπερ εἴρηται, τὰ περιπ-
 τώματα εὐθὺς ἀνέλη, καταβαίνουσιν εἰς τὰς κοιλίας
 ἄπεπτα ὄντα, τοῦτο δὲ ἐστὶ δυσεντερία, διὰ τὸ μὴ
 ἐκκρίνεσθαι ὑπὸ πλήθους τὸ ὑγρὸν. καὶ εἰ μὴ παύ-
 σονται, τεταρταῖοι γίνονται τοῖς σωζομένοις· ἢ γὰρ
 τοῦ ἀπέπτου ὑπόστασις μονιμωτάτη ἐστὶ καὶ σύν-
 20 τonos γίνεται τῷ σώματι, καθάπερ ἢ μέλαινα χολή.
 Διὰ τί, εἰ μὴ τὸ θέρος ἔπομβρον γένηται καὶ νότιον,²⁰
 καὶ τὸ μετόπωρον, ὃ χειμῶν νοσερὸς γίνεται; ἢ
 ὅτι σφόδρα ὑγρὰ τὰ σώματα ὃ χειμῶν λαμβάνει,
 καὶ ἢ μεταβολὴ ἔτι μεγάλη γίνεται ἐξ ἀλέας πολλῆς
 25 καὶ οὐκ ἐκ προσαγωγῆς, διὰ τὸ καὶ τὸ μετόπωρον
 γίνεσθαι ἀλεινόν, ὥστε τοῖς μὲν γίνεσθαι ἀνάγκη
 τὰ ὀξεῖα νοσήματα, μὴ ἀραιοῖς οὖσι· τοῖς γὰρ τοιού-
 τοις ἄνω μᾶλλον τὰ ὑγρὰ περιπτώματα ἀθροίζεται,
 διὰ τὸ τούτους μὲν τοὺς τόπους ἔχειν χώραν, τοὺς
 δὲ κάτω ἑτέρους εἶναι. οἱ οὖν ὄντες πυκνόσαρκοι
 30 οὐ πολλὰ περιπτώματα δέχονται. ψυχομένης οὖν
 τῆς περιπτώσεως τῆς ἐν τοῖς ἄνω μέρεσιν τοῦ
 σώματος, ὥσπερ τοῖς οἰνωμένοις ὅταν ῥιγῶσιν, τὰ
 εἰρημένα νοσήματα συμβαίνει γίνεσθαι. τοῖς δὲ
 ἀραιότεροις πυρετῶν γενομένων, τοὺς ἀπὸ πλείστης
 ἀπεψίας γενομένους πυρετοὺς καύσους συμβαίνει
 35 γίνεσθαι, διὰ τὸ τοῖς τοιούτοις ἐσκεδάσθαι μὲν

quiescent? Otherwise children owing to their moist and hot nature boil over with disease, because no cooling takes place. All that has not cooled during the summer boils over in the autumn. These waste products, if they do not kill outright, settle in the lung and windpipe. (They collect above in the first place because we are heated by the air; for this reason also eye disease appears before fevers in the unhealthy summer.) If then, as has been said, the waste products do not kill at once in the upper parts, they go down unconcocted into the belly, and this is dysentery, because the moisture cannot be secreted owing to its quantity. Even if these symptoms subside, then the survivors suffer from quartan fevers; for the sediment of the unconcocted moisture persists and becomes violent in the body, like black bile.

Why is it that, if the summer and autumn are rainy ²⁰ and wet, the winter is unhealthy? Is it because the winter finds our bodies very wet, and the change from great heat is considerable and not gradual, because the autumn has also been warm, so that some must suffer from acute disorders, unless there is rarity in their bodies? For in such people the moist waste products collect up above, because these parts have room, but the lower ones differ in this respect. But those who have solid flesh do not admit much waste product. Then when the waste which exists in the upper part of the body grows cold, as in drinkers when they shiver, the aforesaid diseases occur. But in rarer bodies, when fevers occur, those which arise from a very large amount of unconcocted matter become remittent fevers, because in persons of this kind the

¹ Omit, or read *οἷον*, "as it were."

861 b

μαλλον κατὰ πᾶν τὸ σῶμα τὰ ὑγρά ἢ τοῖς πυκνο-
 σάρκοις, συνισταμένης δὲ τῆς σαρκὸς αὐτῶν ὑπὸ
 τοῦ χειμῶνος θερμαινόμενα τὰ ὑγρά πυρετοὺς
 862 a ποιεῖν. ἢ γὰρ παντὸς τοῦ σώματος ὑπερβάλλουσα
 θερμότης ἐστὶ πυρετός· ἐπιτεινομένη δὲ διὰ τὸ
 πλῆθος τῆς ἐνυπαρχούσης αὐτοῖς ὑγρότητος καῦσος
 γίνεται.

Διὰ τί, ὅταν ἐκ γῆς ἀτμὸς ἀνίη πολὺς ὑπὸ τοῦ 21
 ἡλίου, τὸ ἔτος λοιμῶδες γίνεται; ἢ ὅτι ὑγρὸν
 ἀνάγκη καὶ ἔπομβρον τὸ ἔτος σημαίνει, καὶ τὴν
 γῆν ὑγρὰν ἀνάγκη εἶναι; οἷον οὖν ἐν ἐλώδει
 τόπῳ ἢ οἴκησις γίνεται. νοσώδης δὲ ἢ τοιαύτη
 ἐστίν. καὶ τὰ σώματα δὴ τότε ἀνάγκη περίτ-
 τωμα πολὺ ἔχειν, ὥστε ἐν τῷ θέρει ἔχειν ὕλην
 νοσώδη.

10 Διὰ τί γίνεται τὰ ἔτη νοσώδη, ὅταν γένηται 22
 φορὰ τῶν μικρῶν βατράχων τῶν φρυνοειδῶν; ἢ
 ὅτι ἕκαστον εὐσθενεῖ ἐν τῇ οἰκείᾳ χώρᾳ τῆς
 φύσεως; καὶ ταῦτα δὴ φύσει ἐστὶν ὑγρά, ὥστε
 ἔπομβρον καὶ ὑγρὸν σημαίνει τὸν ἐνιαυτὸν γίνε-
 σθαι. τὰ δὲ τοιαῦτα ἔτη νοσώδη ἐστίν· ὑγρά γὰρ
 15 τὰ σώματα ὄντα πολὺ ἔχει τὸ περίττωμα, ὃ ἐστὶ
 τῶν νόσων αἴτιον.

Διὰ τί οἱ νότοι οἱ ξηροὶ καὶ μὴ ὑδατώδεις πυ- 23
 ρετώδεις εἰσίν; ἢ ὅτι ὑγρότητα καὶ θερμὴν ἀλλο-
 τρίαν ποιοῦσιν; εἰσὶ γὰρ ὑγροὶ καὶ θερμοὶ φύσει.
 20 τοῦτο δ' ἐστὶ πυρετώδες· ὁ γὰρ πυρετὸς ἐξ ἀμφο-
 τέρας τῆς τούτων ἐστὶν ὑπερβολῆς. ὅταν μὲν οὖν
 ἄνευ ὕδατος πνέωσι, ταύτην ἐν ἡμῖν ποιοῦσι τὴν
 διάθεσιν, ὅταν δὲ ἅμα ὕδατι, τὸ ὕδωρ καταψύχει
 ἡμᾶς. οἱ δὲ ἐκ θαλάττης νότοι καὶ συμφέρουσι

PROBLEMS, I. 20–23

moisture is more scattered throughout the whole body than in those whose flesh is solid, because when the flesh has solidified owing to the cold of winter the moisture grows hot and produces fevers. For excessive heat over the whole body is fever. When this is intensified owing to the amount of moisture therein, it becomes remittent fever.

Why is it that, when considerable vapour arises 21 under the action of the sun, the year is pestilential? Is it because it necessarily implies that the year is wet and rainy, and consequently the earth must be wet? It is just like residence in a marshy place. Such a place is unhealthy. Bodies must then contain considerable waste products and so in the summer they contain unhealthy matter.

Why are the years unhealthy in which there is a 22 large supply of small toad-like frogs? Is it because each species thrives in districts suitable to its nature? The nature of these creatures is moist, so that their presence shows that the year is rainy and wet. Such years are unhealthy, because the body, being wet, contains much waste product, which is the cause of disease.

Why do the south winds which are dry and not 23 watery produce fevers? Is it because they produce an extraneous moisture and heat? For they are naturally wet and warm. This is the cause of fever, for fever arises from excess of both of these conditions. When they blow without rain, they produce this condition in us, but when they blow at the same time as the rain, the water cools us. South winds which blow off the sea are beneficial to plants; for

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τοῖς φυτοῖς· ἐψυγμένοι γὰρ ἀπὸ τῆς θαλάττης
 25 ἀφικνοῦνται πρὸς αὐτά. αἱ δ' ἐρυσίβαι γίνονται
 ὑπὸ ὑγρότητος καὶ θερμῆς ἀλλοτρίας.

Διὰ τί ἐν τοῖς νότοις βαρύτερον ἔχουσι καὶ 24
 ἀδυνατώτερον οἱ ἄνθρωποι; ἢ ὅτι ἐξ ὀλίγου πολὺ
 ὑγρὸν γίνεται διατηκόμενον διὰ τὴν ἀλέαν καὶ ἐκ
 30 πνεύματος κούφου ὑγρὸν βαρὺ; ἔτι δὲ ἡ δύναμις
 ἡμῶν ἐν τοῖς ἄρθροις ἐστί· ταῦτα δὲ ἀνίεται ὑπὸ
 τῶν νοτίων. δηλοῦσι δὲ οἱ ψόφοι τῶν κεκολλ-
 λημένων. τὸ γὰρ γλίσχρον ἐν τοῖς ἄρθροις
 πεπηγὸς μὲν κινεῖσθαι κωλύει ἡμᾶς, ὑγρὸν δὲ λίαν
 ὄν συντείνεσθαι.

Διὰ τί ἀρρωστοῦσι μὲν μᾶλλον τοῦ θέρους, 25
 35 ἀποθνήσκουσι δὲ μᾶλλον οἱ ἀρρωστοῦντες τοῦ
 χειμῶνος; ἢ ὅτι τοῦ χειμῶνος διὰ τὴν πυκνότητα
 ἐντὸς τῶν σωμάτων συνεσταλμένου τοῦ θερμοῦ, καὶ
 πονοῦντες μᾶλλον, εἰ μὴ πέττοιμεν, <διὰ>¹ τῶν ἐν
 ἡμῖν συνισταμένων περιπτωμάτων, ἰσχυρὰν ἀνάγκη
 832 b τὴν ἀρχὴν εἶναι τῆς νόσου; τοιαύτην δὲ οὔσαν
 φθαρτικὴν εἰκὸς ἐστὶν αὐτὴν εἶναι. ἐν δὲ τῷ
 θέρει, μανοῦ καὶ κατεψυγμένου παντὸς τοῦ σώματος
 καὶ ἐκλελυμένου πρὸς τοὺς πόνους ὄντος, ἀρχὰς
 νόσων ἀνάγκη πλείους μὲν γίνεσθαι διὰ τε κόπους
 5 καὶ ἀπεψίαν τῶν εἰσφερομένων (καὶ γὰρ οἱ νέοι
 καρποὶ τότε εἰσίν), ἀλλ' οὐχ οὕτως ἰσχυράς, διὸ
 εὐβοήθητοι.

Διὰ τί μετὰ τὰς τροπὰς ἀμφοτέρας μέχρι ἑκατὸν 26
 ἡμερῶν ἀποθνήσκουσι μάλιστα; ἢ ὅτι ἄχρι το-
 σούτου ἑκατέρω ἢ ὑπερβολὴ διέχει, ἢ τε τοῦ
 10 θερμοῦ καὶ τοῦ ψυχροῦ; ἢ δὲ ὑπερβολὴ τοῖς
 ἀσθενέσι ποιεῖ τὰς νόσους καὶ τὰς φθοράς.

Διὰ τί τὸ ἔαρ καὶ τὸ φθινόπωρον νοσώδη; ἢ 27

PROBLEMS, I. 23-27

they reach them cooled by blowing off the sea. Mildew is also due to extraneous wet and heat.

Why in the south wind do men feel heavier and ²⁴ less capable of exertion? Is it because the moisture melted by the warm weather becomes considerable instead of slight, and light air is replaced by heavy moisture? Besides, our strength lies in our joints, and these are made slack by the wet. The creaking of things stuck together shows this. For the gelatinous substance in the joints sets hard and prevents us from moving, but if on the other hand it is too wet, it prevents us from bracing ourselves.

Why is it that men are more apt to be ill in the ²⁵ summer, but that the ill are more apt to die in the winter? Is it because in the winter the heat collects in our bodies owing to their density, and, since we suffer more if we cannot concoct it owing to the waste products which collect in us, the onset of the disease must be violent? An attack of this kind is liable to be fatal. But in the summer, when the whole body is porous, cool and slack in relation to work, more diseases must make their appearance, because of our fatigue and the failure to digest what we swallow (for it is the time of fresh fruit), but the diseases are not so severe, because there is more opportunity to deal with them.

Why do many more die during the hundred days ²⁶ after the summer and winter solstice? Is it because this is the period up to which the two excesses, heat and cold, extend? And excess causes disease and death to the weak.

Why are spring and autumn unhealthy? Is it ²⁷

¹ Added by Forster.

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ὅτι αἱ μεταβολαὶ νοσώδεις; τὸ δὲ μετόπωρον τοῦ
 ἔαρος νοσωδέστερον, ὅτι μᾶλλον τοῦ θερμοῦ ψυ-
 χομένου ἢ τοῦ ψυχροῦ θερμαινομένου νοσοῦμεν.
 15 ἐν μὲν οὖν τῷ ἔαρι τὸ ψυχρὸν θερμαίνεται, ἐν δὲ
 τῷ μετοπώρῳ τὸ θερμὸν ψύχεται.

Διὰ τί ἐν τῷ χειμῶνι ἐλάττω μὲν τὰ ἄρρω- 28
 στήματα ἢ ἐν τῷ θέρει, θανάσιμα δὲ μᾶλλον; ἢ
 ὅτι ἐν μὲν τῷ θέρει ἀπὸ μικρᾶς προφάσεως τὰ
 ἄρρωσθήματα, ἐν δὲ τῷ χειμῶνι οὐ; πεπτικώτεροι
 20 γὰρ καὶ ὑγιεινότεροι ἡμῶν αὐτῶν, ὥστε εἰκότως
 τὰ ἀπὸ μείζονος προφάσεως γινόμενα μείζω καὶ
 ἀναιρετικώτερα. ταῦτό δὲ τοῦτο καὶ ἐπὶ τῶν
 ἀθλητῶν καὶ ὅλως ἐπὶ τῶν ὑγιεινῶς διακειμένων
 ὀρώμεν· ἢ γὰρ οὐ λαμβάνονται νόσῳ, ἢ ταχὺ
 συναπίασιν· μεγάλης γὰρ αἰτίας δέονται.

25 Διὰ τί τοῦ μὲν φθινοπώρου καὶ τοῦ χειμῶνος 29
 οἱ καῦσοι μᾶλλον γίνονται ἐν ταῖς ψυχραῖς ὥραις,
 τοῦ δὲ θέρους τὰ ρίγη ἐνοχλεῖ καυμάτων ὄντων;
 ἢ ὅτι τῶν κατὰ τὸν ἄνθρωπον ἡ χολὴ μὲν ἐστὶ
 θερμὸν, τὸ δὲ φλέγμα ψυχρὸν; ἐν μὲν οὖν τῷ
 30 θέρει τὸ ψυχρὸν ἀναλύεται, καὶ διαχυθὲν ρίγη καὶ
 τρόμους παρασκευάζει· ἐν δὲ τῷ χειμῶνι τὸ
 θερμὸν ὑπὸ τῆς ὥρας κρατεῖται κατεψυγμένον.
 οἱ δὲ καῦσοι μᾶλλον ἐνοχλοῦσι τοῦ χειμῶνος καὶ
 τοῦ φθινοπώρου, ὅτι διὰ τὸ ψῦχος τὸ θερμὸν εἴσω
 συστέλλεται, ὃ δὲ καῦσος ἔσωθέν ἐστι καὶ οὐκ
 ἐπιπολῆς· εἰκότως οὖν οἱ καῦσοι ταύτην τὴν ὥραν
 35 γίνονται. καταμάθοι δ' ἂν τις τοῦτο ἀκριβέστερον
 ἐπὶ τῶν ψυχρολουτρούντων τοῦ χειμῶνος καὶ τῶν
 τοῦ χειμῶνος λουομένων τῷ θερμῷ, ὅτι οἱ μὲν τῷ

PROBLEMS, I. 27-29

because all change is unhealthy? But the autumn is more unhealthy than the spring, because we are more liable to disease when hot changes to cold, than when cold changes to hot. In the spring, then, the cold is growing hot, but in the autumn the hot is growing cold.

Why are diseases fewer in the winter than in 28 the summer, but they are more liable to be fatal? Is it because in the summer illnesses arise upon very small provocation, but in winter this is not the case? For at this season we are at our best in relation to concoction and health, so that naturally illnesses which arise only upon a more serious provocation are more severe and are more likely to be fatal. We see this same point illustrated in the case of athletes and generally in those who have a healthy constitution. Either they are not victims of disease or (if they are) they quickly die, for they need a severe cause to make them ill.

Why are remittent fevers commoner in the cold 29 seasons of late autumn and winter, but chills are troublesome when it is hot in the summer? Is it because in man bile is hot, but phlegm is cold? So in the summer the cold is dispersed, and when dissipated produces chills and trembling. But in the winter the heat is mastered by the season and grows cold. But remittent fevers are more troublesome in winter and autumn, because the heat is collected within owing to the cold, and remittent fever is within and not on the surface. Naturally, therefore, remittent fevers occur throughout this season. One could study this more exactly in the case of those who wash in cold water in the winter and those who wash in hot. For those who wash in

862 b ψυχρῶ λουόμενοι, ἀπορριγώσαντες ὀλίγον χρόνον
 868 a ἕως λούονται, τὴν λοιπὴν ἡμέραν οὐδὲν πάσχουσιν
 ὑπὸ τοῦ ψυχροῦ, οἱ δὲ τῷ θερμῷ ὕδατι χρησάμενοι
 δυσριγοτέρως διάγουσι. τῶν μὲν γὰρ τῷ ψυχρῷ
 λουομένων πυκνοῦται ἢ σὰρξ καὶ συστέλλεται
 εἴσω τὸ θερμόν, τῶν δὲ θερμολουτρούντων ἢ σὰρξ
 8 ἀραιοῦται καὶ τὸ θερμόν ἕως τοῦ ἔξω τόπου
 περισπᾶται.

Τίς καταπλάσματος ἀρετή; ἢ διὰ τὸ χυτικὸν 30
 εἶναι καὶ ἰδρῶτα ποιοῖ καὶ ἀποπνοήν;

Τῷ δῆλον ὅταν ἔμπυον; ἢ εἰ καὶ καταχεομένου 31
 τοῦ θερμοῦ ἀλλαγῇ, ἔμπυον, εἰ δὲ μή, οὐ;

10 Ποῖα δεῖ καίειν ἢ ποῖα δεῖ τέμνειν; ἢ ὅσα μὲν 32
 ἔχει στόμα μέγα καὶ οὐ ταχὺ συμφύεται, ταῦτα
 καίειν δεῖ, ὅπως ἢ ἐσχάρα ἐκεῖ πέση; οὕτως γὰρ
 οὐκ ἔσται ὕπουλα.

Τίς ἐναίμου ἀρετή; ἢ τὸ ξηραντικὸν εἶναι καὶ 33
 τῆς ἐπιούσης περιπτώσεως σταλτικὸν ἄνευ ἐσχα-
 15 ρώσεως καὶ σήψεως τῆς σαρκός; οὕτω γὰρ ἂν
 ἀφλέγμαντον εἶη καὶ συμφυτικόν. μὴ ἐπιρρέοντος
 μὲν γὰρ ἀφλέγμαντον ἔσται, ξηρὸν δὲ ὄν συμ-
 φύσεται· ἕως δ' ἂν ὑγροροῇ, οὐ συμφύσεται. διὰ
 τοῦτο οὖν δριμέα τὰ πλείιστα, ὥστε ἀποστύφειν.

Ποῖα τέμνειν δεῖ καὶ ποῖα καίειν, καὶ ποῖα οὐ, 34
 20 ἀλλὰ φαρμάκοις; ἢ τὰ μὲν ἐπὶ ταῖς μασχάλαις
 καὶ βουβῶσι φαρμάκῳ; μετὰ γὰρ διαίρεσιν τὰ μὲν
 ἐπίπονα, τὰ δὲ ἐπικίνδυνα. καίειν δὲ τὰ πλατέα

PROBLEMS, I. 29-34

cold water shiver for a short time while they are actually washing, and do not feel the effects of the cold for the rest of the day, while those who use hot water spend the whole day rather cold. For the flesh of those who wash in cold water becomes dense and the heat is collected within, but with those who wash in hot water the flesh grows porous and the heat is diverted to the outside.

What virtue is there in a poultice? Is it because 30 owing to its dissolving power it produces sweat and evaporation?

How is it obvious when there is suppuration? If 31 any change takes place when hot water is poured over it, is there suppuration, but otherwise not?

Which wounds should be cauterized, and which 32 should be cut? Is it true that those that show a large gap and do not readily heal should be cauterized, so that a scab may form there? Then there will be no suppuration under the skin.

What is the virtue of a styptic? Is it that it is 33 a drying agent, capable of contracting the overflow of wastage, without producing a scab or decay of the flesh? In this case the wound will be free from inflammation and inclined to heal. If it ceases to flow, it will be free from inflammation, and, being dry, it will heal, but so long as the moisture flows, it will not heal. Most styptics are therefore astringent so as to cause contraction.

What kind of wounds should be cut, what cauter- 34 ized, and what should be treated in neither way, but by drugs? Should those in the arm-pit and groin be treated with drugs? For such wounds after cutting are sometimes painful and sometimes dangerous.

863 a

τῶν φυμάτων καὶ πολὺ πρόβλημα ἔχοντα, καὶ ἐν φλεβώδεσι καὶ μὴ εὐσάρκοις. τέμνειν δὲ τὰ εἰς ὄξυ συνηγμένα καὶ τὰ μὴ ἐν στερεοῖς.

25 Διὰ τί, εἰς χαλκῶ τις τμηθῆ, ῥᾶον ὑγιάζεται ἢ σιδήρῳ; πότερον ὅτι λειότερον, ὥσθ' ἦττον σπαράττει καὶ ποιεῖ πληγὴν; ἢ εἴπερ ἀκμὴν μάλλον ὁ σίδηρος λαμβάνει, ῥᾶων καὶ ἀπαθεστέρα ἢ διαίσεις; ἀλλὰ μὴν φαρμακῶδες ὁ χαλκός, ἢ δὲ
30 ἀρχὴ ἰσχυρόν. τὸ οὖν εὐθὺς ἅμα τῇ τομῇ θᾶπτον τὸ φάρμακον ποιεῖ τὴν σύμφυσιν.

Διὰ τί δὲ καὶ τὰ διὰ χαλκοῦ καύματα θᾶπτον ὑγιάζεται; ἢ ὅτι μανότερον καὶ ἦττον σωματικόν, ἐν δὲ τοῖς στερεωτέροις πλείων ἢ θερμότης;

Πότερον ἢ πτισάνη κουφοτέρα ἢ κριθίνη καὶ
85 βελτίων πρὸς τὰ ἀρρωστήματα ἢ ἢ πυρίνη; δοκεῖ
863 b γάρ τισιν αὕτη σημείον ποιουμένοις τοὺς μεταχειριζομένους, ὅτι πολὺ εὐχρόστεροι οἱ περὶ τὴν τῶν ἀλεύρων ἐργασίαν ἢ τὴν τῶν ἀλφίτων. εἴθ' ὅτι ὑγρότερον ἢ κριθή, τὸ δὲ ὑγρότερον πλέονος (οὔσης) πέψεως. ἢ οὐθὲν κωλύει ἔνια ἔχειν
5 δυσπεπτότερα καὶ ἔνια πρὸς κουφότητα χρησιμώτερα; οὐ γὰρ μόνον ὑγροτέρα ἐστὶν ἢ κριθὴ τοῦ πυροῦ, ἀλλὰ καὶ ψυχροτέρα. δεῖ δὲ τὸ ῥόφημα καὶ τὸ προσφερόμενον τοιοῦτον εἶναι τῷ πυρέττοντι, ὃ τροφήν τε βραχεῖαν ποιήσει καὶ καταψύξει. ἢ δὲ πτισάνη τοῦτο ἔχει ἢ κριθίνη· διὰ γὰρ τὸ ὑγρό-

^a A belief in the evil nature of iron existed all through antiquity. Plutarch tells us that no iron was ever allowed in a Greek temple.

PROBLEMS, I. 34-37

35 Flat tumours and those which have a considerable protuberance should be cauterized, and those in parts which have many veins and are not fleshy. The knife should be used upon those which have come to a sharp point and those which are not in the solid parts of the body.

36 Why is it that a wound heals more quickly if it is cut with a bronze than with a steel knife? ^a Is it because the former is smoother, so that it tears the flesh less and makes a smaller wound? Or, even though steel takes an edge better, is it because the division by bronze is easier and less painful? Moreover, the bronze itself has curative properties and the action at the beginning is all-important. So the drug acting at the moment of cutting makes it heal more quickly.

37 Why do burns produced by bronze heal more quickly than others? Is it because bronze is more porous and has less "body," and heat is greater in things which are more solid?

Is gruel made from barley lighter and better in 37 illness than when made from wheat? Some who believe this draw an inference from those who handle it, arguing that those who are employed in grinding barley have a much better complexion than those who grind wheat, and further that barley is moister, and the moist is more easy to digest. Perhaps there is nothing to prevent its having some qualities which make it more difficult to concoct and others more useful because of their lightness. For barley is not merely moister than wheat but also colder. For gruel and anything similar which is given to a feverish patient should have two qualities: it should supply light nourishment and produce cooling. Now barley gruel has both these qualities; for being rather moist

863 b

10 τερον ἢ σωματωδέστερον εἶναι ὀλίγον δίδωσι, καὶ τοῦτο ψυκτικόν.

Διὰ τί τὴν αἰμωδίαν παύει ἢ ἀνδράχνη καὶ ἄλεις; ἢ ὅτι ἢ μὲν ὑγρότητα τινὰ ἔχει; φανερὰ δὲ αὕτη μασωμένοις τε, καὶ ἐὰν συνθλασθῆ χρόνον τινά· ἔλκεται γὰρ ἢ ὑγρότης. τὸ δὲ γλίσχρον εἰσ-
15 δυόμενον ἐξάγει τὸ ὀξύ. καὶ γὰρ ὅτι συγγενῆς, ἢ ὀξύτης σημαίνει· ἔχει γὰρ τινὰ ὀξύτητα ὁ χυμός. ὁ δὲ ἄλεις συντήκων ἐξάγει καὶ τὴν ὀξύτητα. διὰ τί οὖν ἢ κονία καὶ τὸ νίτρον οὐ; ἢ ὅτι στύφει καὶ οὐ τήκει;

Διὰ τί τοὺς μὲν θερινοὺς κόπους λουτρῶ ἰᾶσθαι δεῖ, τοὺς δὲ χειμερινοὺς ἀλείμμασιν; ἢ τοὺς μὲν
20 ἀλείμματι διὰ τὰς φρίκας καὶ τὰς γενομένας μεταβολάς; θερμὴ γὰρ λύειν δεῖ, ἢ ποιήσει ἀλεάζειν· τὸ δ' ἔλαιον θερμόν. ἐν δὲ τῷ θέρει καθυγραίνειν· ἢ γὰρ ὥρα ξηρά, καὶ οὐ φοβεραὶ αἱ φρίκαι διὰ τὴν
25 εἰς ἀλέαν ἔκκλισιν. ὀλιγοσιτία δὲ καὶ κωθωνισμὸς θέρους, τὸ μὲν ὄλως, τὸ δὲ μάλλον, ὁ μὲν πότος θέρους ὄλως διὰ τὴν ξηρότητα, ἢ δὲ ὀλιγοσιτία κοινὸν μὲν, μάλλον δὲ θέρους· ἐκθερμαίνεται γὰρ διὰ τὴν ὥραν ὑπὸ τῶν σιτίων.

Διὰ τί τῶν φαρμάκων τὰ μὲν τὴν κοιλίαν λύει,
30 τὴν δὲ κύστιν οὐ, τὰ δὲ τὴν μὲν κύστιν λύει, τὴν κοιλίαν δὲ οὐ; ἢ ὅσα μὲν ἐστὶν ὑγρά τὴν φύσιν καὶ ὕδατος μεστά, ταῦτα ἂν ἢ φαρμακώδη, λύει τὴν κύστιν; ἐκεῖ γὰρ ὑφίσταται τὰ ἄπεπτα τῶν ὑγρῶν· ὑποδοχὴ γὰρ ἐστὶν ἢ κύστις τοῦ μὴ πεπτομένου ὑγροῦ ἐν τῇ κοιλίᾳ, ὃ οὐ μένει, ἀλλὰ πρὶν
28

PROBLEMS, I. 37-40

than substantial it supplies a little nourishment and that little is cooling.

38 Why do purslane and salt check bleeding of the gums? Is it because the former contains moisture? This becomes obvious if one chews it, or if it is crushed together for some time, for thus moisture is drawn from it. The viscous part sinks in and draws out the acidity. Its acidity shows its affinity, for the juice has a certain acidity. Salt on the other hand drives out the acidity by melting. Why, then, do not lye and nitre do the same thing? Is it because they produce contraction and not melting?

39 Why must summer fatigue be cured by baths, and winter fatigue by anointing? Is the latter treated by anointing because of shivering and the change arising therefrom? For the cold must be treated by heat, which warms it, and oil is hot. In the summer, on the other hand, moisture is needed, for the season is dry, and the shivering is not to be feared because the natural inclination of the body is towards heat. Summer requires scanty solid food and considerable liquid; the former is wise generally, but the latter is more important in the summer. Drinking is generally common in summer because of the dryness, but scanty solid food is common to all seasons, but especially appropriate to summer, for the body is heated by solid food owing to the season.

40 Why do some drugs relax the stomach, but not the bladder, while others relax the bladder, but not the stomach? Is it because all medicinal foods, which are naturally wet and full of water, relax the bladder? For there all the undigested wet matter collects, for the bladder is the receptacle of all undigested moisture in the stomach, which does not remain there, but

863 b

35 ποιῆσαί τι ἢ παθεῖν ὑποχωρεῖ. ὅσα δὲ ἐκ γῆς τὴν
864 a φύσιν ἐστίν, ἂν ἢ φαρμακώδη, ταῦτα δὲ τὴν κοιλίαν
λύει· εἰς ταύτην γὰρ ἢ φορὰ τῶν γεωδῶν. ὥστε
ἂν ἢ κινητικόν, ταραττει.

Διὰ τί δὲ τὰ μὲν τὴν ἄνω κοιλίαν, τὰ δὲ τὴν κάτω 41
κινεῖ, οἷον ἐλλέβορος μὲν τὴν ἄνω, σκαμμωνία δὲ
5 τὴν κάτω, τὰ δὲ ἄμφω, οἷον ἐλατήριον καὶ τῆς
θαψίας ὁ ὀπός; ἢ ὅτι τὰ μὲν ἐστὶ θερμά, τὰ δὲ
ψυχρὰ τῶν φαρμάκων τῶν τὴν κοιλίαν κινούντων,
ὥστε τὰ μὲν διὰ τὴν θερμότητα εὐθὺς ἐν τῇ ἄνω
κοιλίᾳ ὄντα φέρεται ἐξ αὐτῆς πρὸς τὸν ἄνω τόπον,
καὶ κεῖθεν συντήξαντα μάλιστα μὲν τὰ ἀλλοτριώτατα
10 καὶ ἥκιστα συμπεφυκότα, ἂν δὲ ἰσχυρὸν ἢ τὸ
φάρμακον ἢ πλεον δοθῇ τῆς φύσεως, κατάγει εἰς
τὴν ἄνω κοιλίαν ταῦτά τε καὶ εἴαν τι περίπτωμα
ἢ, καὶ διὰ τὴν θερμότητα ταραττον τὸ πνεῦμα πολὺ
γινόμενον ὑπ' αὐτοῦ, προσιστὰν τοὺς ἐμέτους
15 ποιεῖ. τὰ δὲ ψυχρὰ τὴν φύσιν αὐτῶν διὰ βάρος
καὶ πρὶν παθεῖν τι ἢ ποιῆσαι κάτω φέρεται,
καὶ κεῖθεν ὀρμῶντα τὸ αὐτὸ δρᾶ τοῖς ἄνω· κατὰ γὰρ
τοὺς πόρους ἀνιόντα ἐκεῖθεν, καὶ κινήσαντα ὧν
ἂν κρατήσῃ περιπτωμάτων καὶ συντηγμάτων,
λαβόντα τὴν αὐτὴν ἄγει ὁδόν. ὅσα δὲ ἀμφοῖν
20 μετέχει καὶ ἐστὶ μικτὰ τῶν φαρμακῶδων ἐκ
θερμοῦ καὶ ψυχροῦ, ταῦτα δὲ δι' ἑκατέραν τὴν
δύναμιν ἀπεργάζεται ἄμφω, ὥσπερ καὶ νῦν παρα-
σκευάζουσιν οἱ ἰατροὶ μὴ γινύστες ἀλλήλοις.

Διὰ τί τὰ φάρμακα καθαίρει, ἄλλα δὲ πικρότερα 42
ὄντα καὶ στρυφνότερα καὶ τοῖς ἄλλοις τοῖς τοιούτοις

^a A plant allied to the convolvulus.

^b According to Pliny (*N.H.* xx. 1. 3), a drug prepared from the wild cucumber.

^c A plant used for yellow dye.

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drains away before producing or undergoing any action. But all medicinal foods which are earthy by nature relax the stomach, for into the stomach passes all earthy matter. So that, if it has the power of producing any motion, it upsets the stomach.

Why is it that some drugs move the upper part 41 of the stomach, and some the lower? For instance hellebore moves the upper part, scammony ^a the lower part; some, such as elaterium ^b and the juice of the thapsia, ^c affect both. Is it because of the drugs which move the stomach, some are hot but others cold? Hence the former because of their heat when in the upper stomach are immediately carried from it into the upper region, and there melt what is most foreign and least natural to it. If, then, the drug is strong or an unnaturally large dose is administered, it carries all these elements into the upper stomach, and any waste product that there may be. Owing to the heat of the drug the breath which is produced by it in large quantities produces disturbance, and causes vomiting by interrupting the flow. Naturally cold drugs, on the other hand, are carried downwards because of their weight before they produce or undergo any action, and there cause the same result as the hot drug in the upper part, for rising from there through the ducts and moving any waste products and melted masses over which they prevail, they take the same road. But those drugs which share in both qualities and are a mixture of hot and cold, these produce both results according to their distinctive powers, so that physicians even now prepare a dose by mixing them with each other.

Why are drugs purgative, but other things which 42 are more bitter and more astringent or abound in

^{864 a}
 25 ὑπερβάλλοντα οὐ καθαίρει; ἢ διότι οὐ διὰ τὰς
 τοιαύτας δυνάμεις καθαίρει, ἀλλ' ὅτι ἄπεπτά ἐστιν;
 ὅσα γὰρ δι' ὑπερβολὴν θερμότητος ἢ ψυχρότητος,
 μικρὰ ὄντα τοὺς ὄγκους, ἄπεπτά ἐστι καὶ οἷα
 κρατεῖν, ἀλλὰ μὴ κρατεῖσθαι ὑπὸ τῆς τῶν ζώων
 30 θερμότητος, εὐδιάχυτα ὄντα ὑπὸ τῶν δύο κοιλιῶν,
 ταῦτα φάρμακά ἐστιν. ὅταν γὰρ εἰς τὴν κοιλίαν
 εἰσέλθωσι καὶ διαχυθῶσι, φέρονται καθ' οὔσπερ
 ἢ τροφή πόρους εἰς τὰς φλέβας, οὐ πεφθέντα δέ,
 ἀλλὰ κρατήσαντα ἐκπίπτει φέροντα τὰ ἐμπόδια
 αὐτοῖς· καὶ καλεῖται τοῦτο κάθαρσις. χαλκὸς δέ
 35 καὶ ἄργυρος καὶ τὰ τοιαῦτα ἄπεπτα μὲν ἐστὶν ὑπὸ
 τῆς τῶν ζώων θερμότητος, ἀλλ' οὐκ εὐδιάχυτα
 ταῖς κοιλίαις. ἔλαιον δὲ καὶ μέλι καὶ γάλα καὶ τὰ
^{864 b} τοιαῦτα τῆς τροφῆς καθαίρει, ἀλλ' οὐ τῷ ποιῶ,
 ἀλλὰ τῷ ποσῶ· ὅταν γὰρ διὰ πλῆθος ἄπεπτα
 γένηται, τότε καθαίρει, ἄνπερ καθαίρη. διὰ δύο
 γὰρ αἰτίας ἄπεπτά ἐστιν, διὰ τὸ ποιὰ αὐτὰ εἶναι
 ἢ διὰ τὸ ποσά. διόπερ οὐ φάρμακόν ἐστιν οὐδὲν
 5 τῶν εἰρημένων· οὐδὲ γὰρ διὰ δύναμιν καθαίρει.
 στρυφνότης δὲ καὶ πικρότης συμβέβηκεν τοῖς
 φαρμάκοις καὶ δυσωδία τῷ ἐναντίον εἶναι τῇ τροφῇ
 τὸ φάρμακον. τὸ μὲν γὰρ πεφθὲν ὑπὸ τῆς φύσεως,
 τοῦτο προσφύεται τοῖς σώμασι καὶ καλεῖται
 τροφή· τὸ δὲ μὴ πεφυκὸς κρατεῖσθαι, εἰσιόν τε
 10 εἰς τὰς φλέβας καὶ δι' ὑπερβολὴν θερμότητος ἢ
 ψυχρότητος τaráττον· αὕτη δὲ φαρμάκου φύσις
 ἐστίν.

Διὰ τί τὸ μὲν πέπερι πολὺ μὲν ὄν τὴν κύστιν ⁴³
 λύει, ὀλίγον δὲ τὴν κοιλίαν, ἢ δὲ σκαμμωνία πολλή
 οὔσα τὴν κοιλίαν λύει, ὀλίγη δὲ καὶ παλαιὰ τὴν

other such qualities do not act as purgatives? Is it because their purgative action is not due to these qualities, but to the fact that they are unconcocted? For those things which owing to excess of either heat or cold, though they are small in bulk, are not concocted and can master, instead of being mastered by, the heat of the living creature, being easily dissolved by the two stomachs, these act as drugs. For when they pass into the stomach and are dissolved, they are carried by the same ducts as food into the veins, and not being concocted but obtaining mastery they pass through carrying any obstruction with them; this is called purgation. Bronze, silver and the like are not concocted by the heat of the living creature, but are not easily dissolved by the stomachs. But among foods oil, honey, milk and the like are purgatives, not by their qualities but by their bulk; for when they are not concocted because of their amount, then they act as purgatives, if they do so act. For there are two reasons why they are not concocted, their quality and their quantity. Consequently, none of the specified foods are drugs, for it is not owing to their power that they purge. But astringency, bitterness and an unpleasant smell are characteristic of drugs, for drugs are the opposite of a food. For what is naturally concocted becomes part of the body and is called food; but what is not of a nature to be mastered, but enters into the veins and because of its excess of heat and cold causes disturbance, this is the nature of a drug.

Why does pepper in large quantities relax the 43 bladder, but in small quantities the stomach, while scammony in large quantities relaxes the stomach, but in small quantities and when it is old, the bladder?

864 b

15 κύστιν; ἢ διότι ἐκάτερον ἐκατέρας ἐστὶ κινη-
 τικώτερον; τὸ μὲν γὰρ πέπερι οὐρητικόν ἐστίν,
 ἢ δὲ σκαμμωνία καθαρτικόν. τὸ μὲν οὖν πέπερι
 πολὺ μὲν ὄν φέρεται εἰς τὴν κύστιν καὶ οὐ διαχεῖται
 ἐν τῇ κοιλίᾳ, ὀλίγον δὲ ὄν κρατηθὲν διαλύει καὶ
 γίνεται φάρμακον αὐτῆς. ἢ δὲ σκαμμωνία πολλή
 20 μὲν οὔσα εἰς τοῦτο κρατεῖται ὥστε διαχυθῆναι,
 διαχυθεῖσα δὲ γίνεται φάρμακον διὰ τὴν εἰρημένην
 ἐν τοῖς ἀνωτέρω αἰτίαν· ὀλίγη δὲ οὔσα μετὰ τοῦ
 ποτοῦ ἀναπίνεται εἰς τοὺς πόρους, καὶ ταχὺ πρὶν
 τaráξει καταφέρεται εἰς τὴν κύστιν, καὶ ἐκεῖ τῇ
 αὐτῆς δυνάμει ἀπάγει τὰ περιττώματα καὶ τὰ
 25 συντήγματα ὅσα ἐπιπολῆς ἐστίν. ἢ δὲ πολλή,
 ὥσπερ εἴρηται, διὰ τὴν ἰσχὺν πολὺν χρόνον ἐμ-
 μείνασα κατάγει πολλὴν κάθαρσιν καὶ γεώδη.

Διὰ τί τὰς αὐτὰς φλεγμασίας οἱ μὲν ψύχοντες 44
 ὑγιάζουσιν, οἱ δὲ θερμαίνοντες πέττουσιν; ἀλλ' οἱ
 30 μὲν ἀλλοτρία θερμότητι, οἱ δὲ καταψύχοντες τὴν
 οἰκείαν συνάγουσιν.

Διὰ τί μεταβάλλειν δεῖ τὰ καταπλάσματα; ἢ 45
 ὅπως¹ μᾶλλον αἰσθάνηται; τὰ γὰρ συνήθη ὥσπερ
 ἐπὶ τῶν ἐδεσμάτων οὐκέτι φάρμακα, ἀλλὰ τροφή
 35 γίνεται, οὕτω καὶ ἐπὶ τῶν τοιούτων.

Διὰ τί ὑγιεινὸν τὸ τῆς τροφῆς μὲν ὑποστέλλεσθαι, 46
 865 a πονεῖν δὲ πλείω; ἢ ὅτι τοῦ νοσεῖν αἴτιον περιτ-
 τώματος πλῆθος; τοῦτο δὲ γίνεται, ἢνίκα τροφῆς
 ὑπερβολὴ ἢ ἢ πόνων ἔνδεια.

Διὰ τί τὰ φάρμακα καὶ τὰ πικρὰ ὡς ἐπὶ τὸ πολὺ 47
 καὶ τὰ δυσώδη καθαίρει; ἢ ὅτι ἅπαντα τὰ δυσώδη
 5 καὶ πικρὰ ἀπεπτά ἐστι; διὸ καὶ τὰ φάρμακα πικρὰ

¹ ὅπως Richards: ὅτι ὡς Ruelle.

^a Cf. Problem 42.

Is it because pepper affects the one part more and scammony the other? Pepper is diuretic, but scammony is purgative. So pepper in large quantities is carried into the bladder and is not dissolved in the stomach, but in small quantities it is mastered, and relaxing the stomach acts on it as a drug. But scammony in large quantities is so far mastered as to be dissolved, and when dissolved becomes a drug for the reason we have given above; but in small quantities it is borne with the drink into the ducts, and quickly carried into the bladder before it produces any disturbance, and there by its own power it carries away those waste products and excretions which are near the surface. But in large quantities, as has been said, owing to its strength it remains for a long time and carries down with it much purgation and earthy matter.

Why is it that some cure inflammations by cooling 44 them, while others treat the same inflammations with heat and boil them? The latter bring them to a head by a heat from without, while the former cool their natural heat.

Why need poultices be changed? Is it that the 45 patient may feel them more? For as in the case of eatables, what one has become used to ceases to be a drug and becomes a food, and similarly in the case mentioned.

Why is a reduction of food and an increase of 46 exercise healthy? Is it because a quantity of waste product is the cause of disease? Now this occurs owing to excess of food or lack of exercise.

^a Why do drugs which are bitter and evil smelling 47 usually act as purgatives? Is it because all evil-smelling and bitter things are unconcocted? This is

865 a

καὶ δυσώδη· τῷ γὰρ ἄπεπτα εἶναι καὶ κινητικὰ
 μετὰ πικρότητος φάρμακόν ἐστιν. καὶ ἐὰν δοθῆ
 πλείω, διαφθείρει. ὅσα δέ, κὰν μικρὰ δοθῆ, δια-
 φθαρτικά, ταῦτα οὐ φάρμακα λέγεται εἶναι, ἀλλὰ
 10 θανατηφόρα. οὐδ' ὅσα μὴ τῷ ποιῶ καθαίρει, οὐκ
 ἔστι φάρμακα. καὶ γὰρ τῆς τροφῆς πολλὰ μὲν
 ταῦτὸ ποιεῖ, ἐὰν ποσὰ δοθῆ, οἶον γάλα, ἔλαιον,
 γλεῦκος· ἅπαντα δὲ ταῦτα διὰ τὸ μὴ εἶναι εὔπεπτα
 καθαίρει, καὶ τούτοις οἷς μὴ εὔπεπτα καθαίρει καὶ
 τούτους. ἔστι γὰρ ἄλλα ἄλλοις εὔπεπτα καὶ δύσ-
 15 πεπτα. διὸ οὐ πᾶσι ταῦτὰ φαρμακώδη, ἀλλ'
 ἐνίοις ἴδια. ὅλως γὰρ τὸ φάρμακον δεῖ οὐ μόνον
 μὴ πέττεσθαι, ἀλλὰ καὶ κινητικὸν εἶναι, ὥσπερ καὶ
 τὸ γυμνάσιον ἔξωθεν ἤκον ἢ ἔσωθεν τῇ κινήσει
 ἐκκρίνει τὰ ἀλλότρια.

Διὰ τί τὰ μὲν εὐώδη οὖρητικά καὶ σπέρματα καὶ 48
 20 φυτά; ἢ ὅτι θερμὰ καὶ εὔπεπτα, τὰ δὲ τοιαῦτα
 οὖρητικά· ταχὺ γὰρ λεπτύνει ἢ ἐνοῦσα θερμότης,
 καὶ ἡ ὀσμὴ οὐ σωματώδης, ἐπεὶ καὶ τὰ ὀσμώδη,
 οἶον σκόροδα, διὰ τὴν θερμότητα οὖρητικά, μᾶλλον
 μέντοι συντηκτικά· θερμὰ δὲ τὰ εὐώδη σπέρματα.

25 Διὰ τί δεῖ πρὸς μὲν τὰ μὴ καθαρὰ καὶ φαῦλα τῶν 49
 ἔλκων ξηροῖς καὶ δριμέσι καὶ στρυφνοῖς χρῆσθαι
 φαρμάκοις, πρὸς δὲ τὰ καθαρὰ καὶ ὑγιαζόμενα
 ὑγροῖς καὶ μανοῖς;¹ ἢ διότι ἀπὸ μὲν τῶν μὴ κα-
 θαρῶν δεῖ ἀφαιρεῖν τι; τοῦτο δ' ἐστὶν ὑγρότης
 30 ἀλλοτρία, ἣν ἀφαιρεῖν δεῖ. τὰ δηκτικά δὲ καὶ
 δριμέα καὶ στρυφνὰ τοιαῦτα, καὶ τὸ ξηρὸν μᾶλλον

why drugs are bitter and evil-smelling. For a drug consists of what is unconcocted and produces motion combined with a bitter taste. If too large a dose is administered it produces death. Those things which produce death, even if given in small quantities, are not called drugs, but poisons. Nor are those things drugs which do not purge by their quality. For many foods produce the same effect, if large doses are given, such as milk, oil and unfermented wine. All such things have a purgative effect because they are not easily concocted, and they purge those by whom they are not easily concocted. For to different persons some things are concocted easily and some with difficulty. So the same things do not act as drugs on all men, but some men have their own specifics. Speaking generally, the drug must not merely be unconcocted but must also produce motion, just as exercise whether inside or outside expels foreign matter by movement.

Why are sweet-smelling seeds and plants diuretic? 48
Is it because they are warm and easily concocted, and such things are diuretic? For the internal heat digests quickly and the smell is not corporeal, since even the strong-smelling plants, like garlic, by their heat are diuretic, though their wasting effect is still more marked. Sweet-smelling seeds are also hot.

Why must one use dry, sharp and astringent drugs 49
upon sores which are unclean and unhealthy, but wet and porous drugs upon sores which are clean and healing up? Is it because something must be removed from unclean sores? That which must be removed is extraneous moisture. Drugs which will do this are biting, harsh and astringent, and dry

¹ *μανοῖς* Monro : *μόνοις* Ruelle.

865 a

τοῦ ὑγροῦ. τὰ δὲ καθαρὰ συνεπουλώσεως δεῖραι μόνον.

Διὰ τί συμφέρει πρὸς τὰ ἀπὸ φλέγματος νοσή- 50
ματα λαγνεία; ἢ ὅτι τὸ σπέρμα περιττώματος
ἀπόκρισις καὶ φύσει ὁμοιον φλέγματι, ὥστε
85 ἀφαιροῦσα πολὺ φλεγματώδες ὠφελεῖ ἢ συνουσία.
πότερον δὲ τροφήν προσφέρειν ἀρχομένῳ βέλτιον
ἢ ὕστερον; ἢ ἀρχομένῳ, ὅπως μὴ προεξησθε-
νηκότι ἢ φλεγμασία ἐπιπίπτῃ; ἢ οὖν ἀπισχναντέον
εὐθύς, ἢ οὕτω προσοιστέον· ἀναλαμβάνειν χρῆ
865 b πρῶτον τοῖς ῥοφήμασι· πραότερα γὰρ καὶ λειότερα
καὶ εὐτηκτότερα, καὶ ἐκδέξασθαι τὴν τροφήν ἐκ
τούτου ῥαδιόν ἐστιν ἀσθενεῖ σώματι. οὐ¹ γὰρ ἐν
τῇ κοιλίᾳ δεῖ παθεῖν τὰ σῖτα πρῶτον, διαχυθῆναι
5 τε καὶ θερμανθῆναι μετὰ πόνου τῷ σώματι ταῦτα
πέπονθεν.

Διὰ τί δεῖ σκοπεῖν τὰ περὶ τὸ οὔρον σημεῖα, ἀπο- 51
λαμβάνοντα τὴν οὔρησιν, εἰ ἤδη πέπεπται, ἢ μὴ
μᾶλλον καὶ συνεχῶς οὔρουντα; ἢ διότι σημεῖον
μὲν τοῦ πεπέφθαι, εἴαν ἢ πυρρόν; τοῦτο δὲ γίνεται
10 μᾶλλον διαλαμβάνουσιν. ἢ διότι ἔνοπτρον γίνεται
ἅπαν μᾶλλον ὑγρὸν χροῆς ὀλίγον ἢ πολὺ ὄν; ἐν
μὲν γὰρ τῷ πολλῷ ὑγρῷ τὰ σχήματα ἐνορᾶται,
ἐν δὲ τῷ ὀλίγῳ τὰ χρώματα, οἷον καὶ ἐπὶ τῆς
δρόσου καὶ τῶν ῥανίδων καὶ ἐπὶ τῶν δακρύων τῶν
ἐπὶ ταῖς βλεφαρίσιν· συνεχῶς μὲν οὖν ἀφιέμενον
15 γίνεται πλείον, διασπώμενον δὲ δέχεται μᾶλλον·
ὥστε κἂν ἢ αὐτὸ τὸ τοιοῦτον ἤδη διὰ τὴν πέψιν,
καὶ φαίνεται μᾶλλον τῆς ἀνακλάσεως γινομένης
καὶ ἐνόπτρου ἔνοπτρον διὰ τὴν διαίρεσιν.

Διὰ τί² οὐ δεῖ πυκνοῦν τὴν σάρκα πρὸς ὑγείαν, 52

¹ οὐ Bussemaker : οὐ Ruelle.

² διὰ τί Sylburg : ὅτι Ruelle.

rather than wet. But clean sores only need to be scarred over.

Why is incontinence good for disease caused by 50 phlegm? Is it because the semen is a separation of waste product and of a nature like phlegm, so that sexual intercourse, by removing a quantity of phlegm-like substance, benefits the body? Is it better to give food at the beginning rather than later on? ^a Should it be at the beginning, in order that the inflammation may not find the patient already weakened? Either the patient should abstain from food at once, or food should be given to him in this way. He should in the first place be fed with gruel; for such food is milder, softer and more easily dissolved, and it is easy for the enfeebled body to derive nourishment from it. For where the food has to be acted on first in the stomach, being dissolved and heated, these processes involve bodily pain.

Why is it necessary, in order to look for evidence 51 in the urine as to whether concoction is complete, to check its flow, rather than to examine it when continuously flowing? Is it because it is a sign of concoction, if it is red? And this shows more when it is checked. Or is it rather because all moisture becomes a reflector of colour more in small than in large quantities? For in a large quantity of water shapes are seen, but in a small quantity colours, as for example in dew and raindrops and in tears on the eyelids; for when the water is allowed to flow continuously it becomes greater in quantity, but when checked it shows colours better, so that if owing to the concoction it has this character (*i.e.* red colour), it is more obvious when reflection takes place and it is visible in a mirror because it is refracted.

Why for health should flesh be not thick but rare? 52

^a This question apparently begins a fresh problem.

865 b

ἀλλ' ἀραιοῦν· ὡσπερ γὰρ πόλις ὑγιεινὴ καὶ τόπος
 20 εὐπνοῦς (διὸ καὶ ἡ θάλασσα ὑγιεινὴ), οὕτω καὶ
 σῶμα τὸ εὐπνοῦν μᾶλλον ὑγιεινόν. δεῖ γὰρ ἢ μὴ
 ὑπάρχειν μηθὲν περίττωμα, ἢ τούτου ὡς τάχιστα
 ἀπαλλάττεσθαι, καὶ αἰεὶ οὕτως ἔχειν τὸ σῶμα ὥστε
 λαμβάνον εὐθὺς ἐκκρίνειν τὴν περίττωσιν, καὶ
 εἶναι ἐν κινήσει καὶ μὴ ἡρεμείν. τὸ μὲν γὰρ μένον
 25 σήπεται ὡσπερ ὕδωρ τὸ μὴ κινούμενον, σηπόμενον
 δὲ νοσοποιεῖ· τὸ δὲ ἐκκρινόμενον πρὸ τοῦ δια-
 φθαρῆναι χωρίζεται. τοῦτο οὖν πυκνουμένης μὲν
 τῆς σαρκὸς οὐ γίνεται (ὡσπερ εἰ γὰρ ἐμφράττονται
 οἱ πόροι), ἀραιουμένης δὲ συμβαίνει. διὸ καὶ οὐ
 δεῖ ἐν τῷ ἡλίῳ γυμνὸν βαδίζειν· συνίσταται γὰρ ἢ
 30 σὰρξ καὶ κομιδῇ ἀποσαρκοῦται, καὶ ὑγρότερον τὸ
 σῶμα γίνεται· τὸ μὲν γὰρ ἐντὸς διαμένει, τὸ δ'
 ἐπιπολῆς ἀπαλλάττεται, ὡσπερ καὶ τὰ κρέα τὰ
 ὀπτὰ τῶν ἐφθῶν μᾶλλον. οὐδὲ τὰ στήθη γυμνὰ
 ἔχοντα βαδίζειν· ἀπὸ γὰρ τῶν ἄριστα ὠκοδομη-
 μένων τοῦ σώματος ὁ ἥλιος ἀφαιρεῖ, ἃ ἡκιστα
 35 δεῖται ἀφαιρέσεως, ἀλλὰ μᾶλλον τὰ ἐντός. ἐκεῖθεν
 μὲν οὖν διὰ τὸ πόρρω εἶναι, εἰ μὴ μετὰ πόνου,
 οὐκ ἔστιν ἰδρῶτα ἀγαγεῖν, ἀπὸ τούτου δὲ διὰ τὸ
 πρόχειρον ῥάδιον.

Διὰ τί ποτε τοῖς χιμέτλοις καὶ τὸ ψυχρὸν ὕδωρ 53
 866 a συμφέρει καὶ τὸ θερμόν; ἢ ὅτι τὰ χίμετλα δι'
 ὑπερβολὴν γίνεται ὑγροῦ; τὸ μὲν οὖν ψυχρὸν
 συνίστησι καὶ τραχύνει τὸ ὑγρόν, τὸ δὲ θερμόν
 ἐκπνευματοῖ καὶ ἔξοδον ποιεῖ τῷ πνεύματι, ἀραιοῦν
 τὴν σάρκα.

5 Διὰ τί τὸ ψυχρὸν καὶ ποιεῖ καὶ παύει τὰ χίμετλα, 54
 καὶ τὸ θερμόν τὰ πυρίκαυστα; ἢ διὰ τὸ αὐτό;
 ποιεῖ μὲν συντήκοντα, παύει δὲ μᾶλλον ξηραίνοντα.

For just as a city or a place which is open to the air is healthy (which is the reason why the sea is healthy), so also a body is more healthy if it admits air. For either there must be no waste product, or the body must be rid of it as soon as possible, and a body should therefore be in such a condition as to remove the waste product as soon as it receives it, and should be always in motion and never quiescent. For what remains behind becomes putrid like water that has no movement, and what is putrid breeds disease, but what is removed is separated before any decay takes place. If, then, the flesh grows dense, this does not happen (for the passages are, so to speak, blocked), but it does happen when the flesh is porous. For this reason one should not walk naked in the sun, for then the flesh sets and becomes very fleshy, and the body becomes more moist; for what is inside remains, and what is on the surface is removed, just like meat roasted rather than boiled. Nor should one walk with the chest bare, for the sun then draws off from the best built parts of the body what least requires to be drawn off rather than the inside parts. Because they are further off it is not possible to draw the sweat from them, except by hard exercise, but from the outside it is easy, because they are close at hand.

Why do both cold and hot water benefit chilblains? 53
 Is it because chilblains are due to excess of moisture? So cold congeals and hardens the moisture, but heat vaporizes it and gives an exit to the breath, rarefying the flesh.

Why does cold both cause and check chilblains, and 54
 heat cause and check burns? Is it due to the same cause in both cases? That is to say, they cause them by liquefaction, and stop them by drying them up.

Ἐν τοῖς πυρετοῖς διδόναι δεῖ τὸ ποτὸν πολλάκις 55
καὶ κατ' ὀλίγον. τὸ μὲν γὰρ πολὺ παραρρεῖ, τὸ δὲ
10 ὀλίγον μὲν, πολλάκις δὲ διαβρέχει καὶ εἰς τὰς
σάρκας χωρεῖ. οἷα γὰρ τὰ ἐν τῇ γῆ, εἰάν μὲν κατὰ
πολὺ ἔλθῃ τὸ ὕδωρ, παραρρεῖ, εἰάν δὲ κατ' ὀλίγον,
βρέχει μόνον, τὸ αὐτὸ καὶ ἐν τοῖς πυρετοῖς. τὰ
γὰρ ῥέοντα ὕδατα εἰάν τις κατ' ὀλίγον ἄγῃ, ὁ
15 ὀχετὸς ἐκπίνει· εἰάν δὲ τὸ ἴσον ἀθρόον ἄγῃ, ὅπου
ἂν ἄγῃ, χωρεῖ. ἔπειτα κατακείσθω ἀκίνητος ὡς
μάλιστα, ἀκίνητος μὲν, ὅτι καὶ τὸ πῦρ φανερώς,
εἰάν τις μὴ κινῆ, καταμαραίνεται. πρὸς πνεῦμα δὲ
μὴ κατακείσθω, διότι ὁ ἄνεμος τὸ πῦρ ἐξεγείρει
καὶ ῥιπτιζόμενον τὸ πῦρ ἐξ ὀλίγου πολὺ γίνεται.
20 περιστελλέσθω¹ δὲ τούτου ἕνεκεν, ὅτι πυρὶ εἰάν ἀνα-
πνοὴν μὴ διδῶς, σβέννυται. καὶ τὰ ἱμάτια μὴ ἀπο-
γυμνούσθω, ἕως ἂν νοτὶς ἐγγένηται· τὸ φανερὸν
γὰρ πῦρ τὸ ὑγρὸν σβέννυσιν. κατὰ ταῦτα δὲ καὶ
ἐν τῇ φύσει. ἐπὶ δὲ τῶν διαλειπόντων πυρετῶν
προπαρασκευάζειν δεῖ καὶ ἐκλούοντα,² καὶ πυριά-
25 ματα πρὸς τοὺς πόδας παρατιθέντα, καὶ περι-
εσταλμένον ἀναπαύεσθαι, ὅπως ὅτι θερμότατος ἢ
πρὸ τοῦ τὴν λῆψιν εἶναι. καὶ γὰρ ὅπου πολὺ πῦρ,
λύχνος οὐ δυνήσεται καίεσθαι· τὸ γὰρ πῦρ τὸ πολὺ
τὸ ὀλίγον ἄγει πρὸς ἑαυτό. τούτου ἕνεκεν πολὺ
πῦρ ἐν τῷ σώματι παρασκευάζειν δεῖ, ὅτι ὀλίγον
30 ὁ πυρετὸς πῦρ ἔχει, ὥστε τὸ πολὺ πῦρ τὸ ὀλίγον
πρὸς ἑαυτό ἄγει.

Τεταρταίοις πυρετοῖς δεῖ μὴ λεπτύνειν, ἀλλὰ πῦρ 56
ἐν τοῖς σώμασιν ἐμποιεῖν εἰσάγοντα. δεῖ δὲ καὶ
τοῖς γυμνασίοις χρῆσθαι. ἢ δὲ ἡμέρα ἢ λῆψις,
λουσάμενον ὕπνον μὴ ζητεῖν. διὰ δὲ τοῦτο καὶ
35 συμφέρει θερμαίνουσα δίαίτα, ὅτι ἀσθενῆς ὁ τε-

¹ περιστελλέσθω Bonitz : περιτέλλεσθαι Ruelle.

² ἐκλούοντα most MSS. : ἐκλύοντα Ruelle.

PROBLEMS, I. 55-56

In fevers one should give drink frequently and in 55 small quantities. For a large quantity flows through, but a small quantity administered frequently soaks in and passes into the flesh. In the same way on the soil, if rain falls in large quantities, it runs off, but if in small quantities, it soaks in; and the same thing occurs in fevers. For a channel drinks up flowing water, if one puts in a little at a time; but if one puts in the same quantity all at once, it runs wherever one directs it. Secondly, let the patient lie as far as possible motionless: motionless, because obviously the fever dies down, if one does not move. But let him not lie in a draught, because the wind stirs up the fire and the flame being fanned becomes great instead of small. For this reason the patient must be well wrapped up, because if you do not give it air the flame is quenched. Nor should clothes be taken off, until moisture appears; for fire which is exposed to the air quenches the moisture. The same thing is true in nature. In the case of intermittent fevers one must make preparations beforehand, bathing and applying fomentations to the feet, and the patient must lie down well wrapped up, in order that he may be as hot as possible before the seizure comes. For a lamp cannot burn where there is a great fire, for the great fire absorbs the little fire into itself. For this reason one must prepare a great fire in the body, for the fever has but a small fire, so that the great fire absorbs the little one.

In quartan fevers the body should not grow thin, 56 but heat should be introduced into it. One should also employ exercise. On the day of the attack, one should wash but one should not attempt to sleep. To this end a heating diet is an advantage, because

ARISTOTLE

866 a

ταρταῖος πυρετός· εἰ γὰρ μὴ ἦν ἀσθενής, οὐκ ἂν
 τεταρταῖος ἐγένετο. ὁρᾶς; ὅπου πῦρ πολὺ, λύχνος
 οὐ δύναται καίεσθαι· τὸ γὰρ πολὺ τὸ ὀλίγον πρὸς
 868 b ἑαυτὸ ἀρπάζει. τούτου δ' ἕνεκεν πολὺ πῦρ ἐν τῷ
 σώματι ἐμποιεῖν, ὅτι ὀλίγον ὁ πυρετὸς πῦρ ἔχει.
 ἔστι δὲ τὸ καθ' ἡμέραν διαίτημα τὸ μὲν πῦρ τὸ
 δὲ νοτίδα εἰς τὸ σῶμα εἰσάγοντα.

Εἰσὶ δὲ νόσοι αἱ μὲν ἀπὸ πυρός, αἱ δὲ ἀπὸ 57
 5 νοτίδος. ἰατρεύονται δὲ αἱ μὲν ἀπὸ πυρός νόσοι
 νοτίδι, αἱ δὲ ἀπὸ νοτίδος πυρί· νοτίδα γὰρ ξηραίνει.

PROBLEMS, I. 56-57

the quartan fever is weak ; if it were not, it would not occur only every four days. Do you follow me ? A lamp cannot burn where there is a great fire, for the great fire absorbs the little one. For this reason one should create considerable heat in the body, because the fever has but a small fire. The daily treatment, therefore, is to introduce both heat and moisture into the body.

Some diseases arise from heat and some from 57 moisture. Those which arise from heat are cured by moisture, and those arising from moisture by heat, for this dries up the moisture.

B

886 b

ΟΣΑ ΠΕΡΙ ΙΔΡΩΤΑ

Διὰ τί οὔτε συντείνουσιν οὔτε κατέχουσι τὸ 1
 10 πνεῦμα γίνεται ἰδρῶς, ἀλλὰ μάλλον ἀνιείσιν; ἢ
 ὅτι τὸ πνεῦμα κατεχόμενον πληροῖ τὰς φλέβας,
 ὥστε κωλύει ἐξιέναι, ὥσπερ τὸ ὕδωρ τὸ ἐκ τῶν
 κλεψυδρῶν, ὅταν πλήρεις οὔσας ἐπιλάβῃ τις. ὅταν
 δὲ ἐξέλθῃ, πολὺς γίνεται διὰ τὸ ἐν αὐτῇ <τῇ¹>
 ἐπιληψία ἀθροισθῆναι κατὰ μικρόν.

15 Διὰ τί οὐχ ἰδρουῖσι τὰ ἐν θερμῷ ὕδατι μέρη, οὐδ' 2
 ἂν θερμὰ ἦ; ἢ διότι κωλύει τὸ ὕδωρ τήκεσθαι, ὃ
 δὲ ἰδρῶς τὸ κακῶς προσωκοδομημένον ἐστὶν ἐν τῇ
 σαρκί, ὅταν ἐκκρίνηται διὰ θερμότητα.

Διὰ τί ὁ ἰδρῶς ἄλμυρόν; ἢ διότι γίνεται ὑπὸ 3
 20 κινήσεως καὶ θερμότητος, ἀποκρινούσης ὅσον ἀλλό-
 τριον ἔνεστιν ἐν τῇ προσφύσει τῆς τροφῆς πρὸς
 αἷμα καὶ τὰς σάρκας; τοῦτο γὰρ τάχιστα ἀφ-
 ἴσταται διὰ τὸ μὴ οἰκεῖον εἶναι καὶ ἔξω ἐξ-
 ικμάζει. ἄλμυρός δ' ἐστὶ διὰ τὸ τὸ γλυκύτετον
 καὶ κουφότατον εἰς τὸ σῶμα ἀνηλωθῆναι, τὸ δὲ
 25 ἀλλοτριώτατον καὶ ἀπεπτότατον ἀπολύεσθαι. τὸ
 τοιοῦτον δὲ ἐν μὲν τῇ κάτω ὑποστάσει οὔρον
 καλεῖται, ἐν δὲ σαρκὶ ἰδρῶς· ἄμφω δὲ ἄλμυρὰ
 διὰ τὴν αὐτὴν αἰτίαν.

¹ <τῇ> added by Bussemaker.

BOOK II

PROBLEMS CONNECTED WITH SWEAT

WHY does sweat occur neither when men are strain- 1
ing nor when holding their breath, but rather when
they let it go? Is it because if the breath is re-
strained it fills the veins, so that it prevents it from
escaping, like the water from water-clocks if anyone
turns them off when full? But when the sweat comes
out, it comes in large quantities because it has col-
lected little by little during the actual time of its
being checked.

Why do not the parts of the body which are in hot 2
water sweat, even if they are hot? Is it because the
water prevents them from melting, but sweat is the
ill-constructed part in the flesh, which comes when
it is expelled by heat?

Why is sweat salt? Is it because it is due to move- 3
ment and heat, which separates out all that is foreign
in the transmission of food to the blood and the flesh?
This is most rapidly thrown off because it does not
really belong and it evaporates outside. Its saltness
is due to the fact that the sweetest and lightest part
is absorbed into the body, but what is most foreign
and difficult of concoction is thrown off. When it is
withdrawn from below it is called urine, but in the
flesh sweat: so both are salt for the same reason.

866 b

Διὰ τί τὰ ἄνω ἰδρουῖσι μᾶλλον τῶν κάτω; πό- 4
 τερον τὸ θερμὸν ἄνω καὶ ἀνέρχεται καὶ ἔστιν ἄνω,
 30 τοῦτο δὲ ἄνω φέρει τὸ ὑγρὸν; ἢ ὅτι πνεῦμα ποιεῖ
 τὸν ἰδρῶτα, τοῦτο δὲ ἐν τοῖς ἄνω; ἢ διότι ἄπεπτον
 ὑγρὸν ὁ ἰδρῶς ἐστι, τοιοῦτο δὲ ἐν τοῖς ἄνω; ἢ γὰρ
 κρᾶσις ἄνω.

Διὰ τί τὰς χεῖρας γυμναζομένοις μάλιστα ἰδρῶς 5
 γίνεται, εἰάν τὰ ἄλλα ὁμοιοσχημονῶμεν; ἢ διότι
 35 ἰσχύομεν μάλιστα τούτῳ τῷ τόπῳ; τούτῳ γὰρ
 τὸ πνεῦμα κατέχομεν τῷ ἔγγιστα τοῦ ἰσχύοντος·
 πονοῦντες δὲ μᾶλλον ἰσχύομεν· οὕτω δὲ ἔχοντες τὸ
 867 a πνεῦμα μᾶλλον κατέχομεν. εἶτα καὶ τῇ τριβομένη
 (χειρὶ)¹ συμπονοῦμεν μᾶλλον ἢ ὅταν ἄλλο μέρος
 τριβώμεθα· τῇ γὰρ καθέξει τοῦ πνεύματος καὶ
 τριβόμενοι γυμναζόμεθα καὶ τρίβοντες.

Διὰ τί ὁ ἰδρῶς ἐκ τῆς κεφαλῆς ἢ οὐκ ὄζει ἢ 6
 5 ἦττον τοῦ ἐκ τοῦ σώματος; ἢ ὅτι εὐπνοῦς ὁ τῆς
 κεφαλῆς τόπος; δηλοῖ δὲ μανὸς ὢν τῇ τῶν τριχῶν
 ἐκφύσει. δυσώδεις δὲ οἱ τόποι καὶ τὰ ἐν αὐτοῖς
 γίνεται ὅσα μὴ εὐπνοα.

Διὰ τί οἱ γυμναζόμενοι εἰάν διαναπαυσάμενοι 7
 παλαίωσι, μᾶλλον ἰδρουῖσιν ἢ εἰάν συνεχῶς; ἢ διὰ
 10 τὸ ἀθροίζεσθαι διαναπαυομένων· ἔπειτα τοῦτον τὸν
 ἰδρῶτα ἐξάγει ὕστερον ἢ πάλῃ. ἢ δὲ συνεχῆς
 ἀναξηραίνει ὥσπερ ὁ ἥλιος.

Διὰ τί μᾶλλον ἰδρουῖσιν, ὅταν μὴ διὰ πολλοῦ 8
 χρόνου χρῶνται ταῖς ἀφιδρώσεσιν; ἢ διότι οἱ
 ἰδρῶτες γίνονται οὐ μόνον δι' ὑγρότητα, ἀλλὰ καὶ
 15 διὰ τὸ τοὺς πόρους ἀνεῶχθαι μᾶλλον καὶ ἀραιὰ

¹ Adding <χειρὶ> from Theophr. *de sud.* 34, the source of this problem.

PROBLEMS, II. 4-8

Why do the upper parts sweat more than the lower? 4
Does the heat rise and collect above, and this carries the moisture up? Or is it because the breath causes sweat, and this exists in the upper part? Or again is it because sweat is unconcocted moisture, and this resides in the upper parts? For the mixing takes place above.

Why does sweat most often come if one exercises 5 the arms, and keeps the other limbs at rest? Is it because this is the region in which our greatest strength lies? For in this part, which is nearest to the strongest part, we hold our breath, and we gain more strength by taking exercise; and in this condition we are better able to hold the breath. Again, we feel the effect of friction more when the arm is rubbed than when we are rubbed elsewhere, for both when being rubbed and when rubbing we take exercise by holding our breath.

Why does sweat from the head either have no 6 smell or less than sweat from the body? Is it because the region of the head is exposed to the air? The porous nature of this region is shown by the growth of hair. But parts of the body and what is in them are ill-smelling when they are not exposed to the air.

Why do athletes sweat more if they wrestle after 7 a rest, than if they continue with the exercise? Is it because, while they are resting, the sweat collects? Then the subsequent wrestling drives out the sweat. But continuous wrestling dries up the sweat like the sun.

Why do men sweat more when they have not 8 sweated for a long time? Is it because sweats are due not merely to moisture but also to the fact that the pores are more open and bodies are porous?

867 a

τὰ σώματα εἶναι; τοῖς μὲν οὖν μὴ χρωμένοις
 συμμεμύκασιν οἱ πόροι, τοῖς χρωμένοις δ' ἀνα-
 στομοῦνται.

Διὰ τί τοῦ ἡλίου μᾶλλον θερμαίνοντος τοὺς 9
 γυμνοὺς ἢ τοὺς ἀμπεχομένους, ἰδρουῦσι μᾶλλον οἱ
 20 ἀμπεχόμενοι; πότερον ὅτι τοὺς πόρους συμμύειν
 ποιεῖ ἐκκαίων ὁ ἥλιος; ἢ διότι τὰς ἀτμίδας
 ξηραίνει; ἀμπεχομένοις δὲ ταῦτα ἦττον συμβαίνει.

Διὰ τί ἰδρουῦσι μάλιστα τὰ πρόσωπα; ἢ ὅσα 10
 ἀραιὰ καὶ ὑγρὰ μάλιστα, διὰ δὲ τούτων ὁ ἰδρῶς
 25 διαπορεύεται. δοκεῖ δὲ πηγὴ εἶναι ἡ κεφαλὴ τοῦ
 ὑγροῦ· διὸ καὶ αἱ τρίχες, διὰ τὸ πολὺ ὑγρόν. ὁ δὲ
 τόπος ἀραιὸς καὶ ἰσχνός· δίεισιν ἄρα κατὰ φύσιν.

Διὰ τί οὗτ' ἀθροῦ ὄντος τοῦ πυρὸς μᾶλλον 11
 ἰδρουῦσιν, οὗτ' ἐλάττονος αἰεί, ἀλλὰ πλείονος ἐπ-
 30 εισφερομένου; οἱ γὰρ ἐν τοῖς πυριατηρίοις ἰδρουῦσι
 μᾶλλον ἢ εὐθὺς εἰ εἴη τοσοῦτον. ἢ ὅτι τὸ σύμ-
 μετρον ἕκαστον ἐργάζεται; οὐκοῦν εἰ τὸ τόσον
 ποιεῖ, τὸ πλεῖον οὐ ποιήσει πλεῖον ἢ μᾶλλον τοῦ-
 ναντίον, ὅτι τῷ τὸ σύμμετρον εἶναι ἐργάζεται τὸ
 ἔργον. διὰ μὲν οὖν τοῦτο οὐχὶ πρὸς πλεῖον μᾶλλον
 35 ἰδρουῦσιν, διὰ δὲ τὸ πρὸς ἕκαστον ἄλλην εἶναι συμ-
 μετρίαν, καὶ τὸ πεποιηκὸς μηκέτι ποιεῖν προσ-
 τιθεμένου μᾶλλον. οὐ γὰρ ταῦτὸ προοδοποιεῖται
 εἰς ἕκαστον καὶ ἐπιτηδείως ἔχειν παρασκευάζει,
 καὶ ἤδη τοῦτο ἐργάζεται, ἀλλ' ἕτερον. τὸ μὲν οὖν
 ὀλίγον μᾶλλον ἢ πολὺ προωδοποίησεν καὶ παρ-
 867 b εσκευάσεν τὸ σῶμα πρὸς τὸ ἰδρουῦν· ἄλλης δὲ δεῖ
 συμμετρίας καὶ πλείονος πρὸς τὸ ποιῆσαι. τοῦτο

PROBLEMS, II. 8-11

So when men have not enjoyed a sweat, the pores are closed, but, when they have, they are open.

Why is it that, though the sun heats the naked 9 more than the well-clad, the well-clad sweat more? Is it because the sun by its heat causes the pores to close? Or is it because it dries the evaporation? And this occurs less with the well-clad.

Why does the face sweat most? Is it because sweat 10 passes most easily through parts which are rare and moist? And the head seems to be the source of moisture, as it is due to the considerable moisture that the hair grows. This part is rare and porous; naturally, therefore, the moisture passes through.

Why do men not sweat more when much heat is 11 applied at once nor when it is gradually lessened but only when it is gradually increased? We sweat more in a vapour bath than we should if the same quantity of heat were applied all at once. Is it because each effect is produced by due proportion? If, therefore, a certain quantity produces some effect, more will not produce a greater effect and may even produce an opposite effect, just because each factor can only produce its due effect when in proportion. Consequently men do not sweat more in the presence of greater heat, but because a different proportion answers to each increase, and that which has produced its effect produces no greater effect when more is added. For the cause which leads the way to each effect and prepares the suitable condition of body is not the same as the cause which produces the effect, but is different. For it is a small cause rather than a great which leads the way and prepares a suitable condition of body for sweating. To produce the sweat needs a different proportion and a greater one. This no

867 b

δὲ οὐκέτι ποιεῖ ὁ πεποίηκεν, ἀλλὰ μετ' αὐτὸ ὕστερον, ἄλλο τῆς συμμετρίας γινόμενον.

Διὰ τί ἀποστλεγγισαμένοις μᾶλλον ρεῖ ὁ ἰδρῶς 12
 ἢ ἐῶσιν ἐπιμεῖναι; πότερον διὰ τὸ καταψύχεσθαι
 ὑπὸ τοῦ ἔξω; ἢ ὅτι ὥσπερ πῶμα γίνεται ὁ ἔξω
 ἰδρῶς ἐπὶ τοῖς πόροις, ὥστε κωλύει τοῦ ἔσωθεν
 τὴν ὀρμήν.

Διὰ τί τὸ πήγανον δυσώδεις τοὺς ἰδρῶτας ποιεῖ, 13
 καὶ ἔνια τῶν μύρων; ἢ ὅτι ὦν ἐν τῇ ὀσμῇ βαρύτης
 10 ἔνι, ταῦτα κεραυνύμενα ταῖς περιπτωματικαῖς
 ὑγρότησι κακωδεστέραν ποιεῖ τὴν ὀρμήν;

Διὰ τί ἰδρουῦμεν τὸν νῶτον μᾶλλον ἢ τὰ πρόσθεν; 14
 ἢ ὅτι ἐν μὲν τῷ πρόσθεν ἐστὶ τόπος ἐντός, εἰς ὃν
 ἀποχετεύεται τὸ ὑγρόν, ἐν δὲ τῷ ὀπισθεν οὐκ
 15 ἔστιν, ἀλλ' ἔξω τὴν ἔκκρισιν ἀναγκαῖον γίνεσθαι;
 τὸ δ' αὐτὸ ἐστὶν αἴτιον καὶ ὅτι τὴν κοιλίαν ἤττον
 ἰδρουῦμεν ἢ τὸ στήθος. ἔτι δὲ ὅτι μᾶλλον δια-
 φυλακτικόν ἐστι τοῦ ἰδρῶτος τὰ νῶτα καὶ τὰ
 ὀπισθεν ἢ τὰ πρόσθεν διὰ τὸ μᾶλλον τὰ ἔμπροσθεν
 τῶν ὀπισθεν ἀποψύχεσθαι. ὅπερ ἐστὶν αἴτιον καὶ
 20 τοῦ τὰς μασχάλας ἰδρουῦν τάχιστα καὶ μάλιστα·
 ἤκιστα γὰρ ψύχονται. ἔτι δὲ σαρκωδέστερά ἐστι τὰ
 περὶ τὸν νῶτον τῶν πρόσθεν, ὥστε ὑγρότερα. πλείων
 δὲ ὑγρότης ἐστὶν ἐν τοῖς ὀπισθεν· ὁ γὰρ μυελὸς
 κατὰ τὴν ράχιν ὦν ὑγρασίαν πολλὴν παρέχει.

25 Διὰ τί ἐφ' ᾧ κατακείμεθα οὐχ ἰδρουῦμεν; ἢ ὅτι 15
 θερμὸς ὦν ὁ τόπος ᾧ ἀπτόμεθα κωλύει διέναι τὸν
 ἰδρῶτα· ἀναξηραίνει γὰρ αὐτόν. ἔτι δὲ θλίβεται,
 θλιβόμενον δὲ διαχεῖται τὸ αἷμα, οὗ συμβαίνοντος
 καταψύχεται μᾶλλον. σημεῖον δὲ ἢ νάρκη· κατά-

PROBLEMS, II. 11-15

longer does what it has already done, but it is a second, coming after the first, and possessing a different proportion.

Why, if men are rubbed down with a strigil, does 12 the sweat flow more freely than if they allow it to remain? Is it because in the latter case it is cooled by the outside air? Or is it because the sweat outside acts as a cover over the pores and prevents the flow of sweat from the inside?

Why do rue and certain other unguents make the 13 sweat smell unpleasant? Is it because those things which have a heavy smell when mixed with the waste moisture make the smell more unpleasant?

Why do we sweat more in the back than in front? 14 Is it because in front there is a place within into which the moisture drains, but there is no such behind, and the moisture must have an exit? The same cause accounts for the fact that we sweat less on the stomach than on the chest. An additional reason is that the back and hind parts are more retentive of sweat than the parts in front, because the front parts are more easily chilled than the hind parts. This is the reason why the armpits sweat most quickly and copiously; for they get the least chilled. Also the hind parts are more fleshy than the parts in front, and are consequently moister; there is more moisture in the hind parts, for the marrow in the spine produces considerable moisture.

Why do we not sweat in the parts on which we lie? 15 Is it because the place we touch being warm prevents the sweat from passing through? For it dries it. Also it is under pressure, and the blood is dispersed under pressure; when this happens the part grows cooler. Numbness proves this; for this affection

867 b
30 ψυξίς τε γάρ ἐστι τὸ πάθος, καὶ γίνεται ἐκ θλίψεως ἢ πληγῆς.

Διὰ τί οἱ καθεύδοντες μᾶλλον ἰδρουῖσιν; ἢ διὰ 16 τὴν ἀντιπερίστασιν; ἀθροισθὲν γὰρ τὸ θερμὸν ἐντὸς ἐξελαύνει τὸ ὑγρὸν.

Διὰ τί τὸ πρόσωπον μάλιστα ἰδρουῖσιν ἀσαρκό- 17
35 τατον ὄν; ἢ ὅτι εὐίδρωτα μὲν ὅσα ὑφυγρα καὶ ἀραιά, ἢ δὲ κεφαλὴ τοιαύτη; ὑγρότητα γὰρ οἰκείαν ἔχει πλείστην. δηλοῦσι δὲ αἱ φλέβες τείνουσαι ἐντεῦθεν, καὶ οἱ κατάρροι ἐξ αὐτῆς, καὶ ὁ ἐγκέφαλος ὑγρός, καὶ οἱ πόροι πολλοί. σημεῖον δὲ αἱ τρίχες ὅτι πολλοὶ οἱ πόροι εἰσὶ περαίνοντες 868 a ἔξω. οὐκ οὖν ἐκ τῶν κάτω ὁ ἰδρώς, ἀλλ' ἐκ τῆς κεφαλῆς γίνεται. διὸ ἰδρουῖσι καὶ πρῶτον καὶ μάλιστα τὸ μέτωπον· ὑπόκειται γὰρ πρῶτον· τὸ δὲ ὑγρὸν κάτω ρεῖ, ἀλλ' οὐκ ἄνω.

5 Διὰ τί οἱ ἰδρουῖντες εἰάν ψυχθῶσιν ἢ ὕδατι ἢ 18 πνεύματι, ναυτιῶσιν; πότερον τὸ ὑγρὸν ψυχθὲν ἔσται ἀθρόον, ἔμπροσθεν οὐκ ἠρεμοῦν διὰ τὸ ρεῖν; ἢ καὶ τὸ πνεῦμα διὸν ἔξω γινόμενον ἰδρῶς διὰ τὴν ψύξιν, τοῦτο ἔσω ψυχθὲν πρὶν ἐξελεθεῖν ὑγρὸν ἐγένετο, καὶ προσπεσὸν ποιεῖ τὴν ναυτίαν;

10 Διὰ τί ποτε ἐκ τῆς κεφαλῆς καὶ τῶν ποδῶν 19 μάλιστα οἱ ἰδρῶτες γίνονται θερμαινομένων; ἢ ὅτι τὸ θερμαινόμενον ἐφέλκει ἐφ' ἑαυτὸ τὸ ὑγρὸν, τὸ δὲ ὑγρὸν οὐκ ἔχει ὅπῃ καταναλίσκεται διὰ τὸ εἶναι τοὺς τόπους τούτους ὀστώδεις; ἐκπίπτει οὖν ἔξω.

15 Διὰ τί οἱ πονοῦντες, ὅτε παύσονται, ἰδρουῖσιν; 20 ἔδει γάρ, εἴπερ ὁ πόνος αἴτιος, ὅταν πονῶσιν.

PROBLEMS, II. 15-20

is a form of cooling and occurs through pressure or a blow.

Why do men sweat more when asleep? Is it owing 16 to the surrounding pressure? For the heat being collected within expels the moisture.

Why do men sweat more in the face though it is 17 very lean? Is it because all the parts which are somewhat moist and rare are inclined to sweat, and the head is of this nature? For it contains very much natural moisture. The veins which extend from this region show this, so also do the discharges from it, the damp character of the brain and its many pores. That the pores which pass through to the outside are many is proved by the hairs. Sweat, then, arises not from the parts below, but from the head. For this reason men sweat first and most on the forehead. For this lies first below the top of the head; and moisture flows downwards and not upwards.

Why do those who sweat vomit if they are chilled 18 either by water or by air? Does the moisture when chilled collect and remain still, having previously been on the move because it was flowing? Or does the air while passing out become sweat, because of the chilling, but having been cooled within before passing out has become liquid, and attacking the patient produces sickness?

Why does sweat flow from the head and the feet most 19 of all when people grow hot? Is it because what grows hot attracts moisture to itself, but the moisture has no place in which it can be dissipated because these parts of the body are bony? Hence it escapes outside.

Why do men taking exercise sweat when they 20 leave off? For if the exercise is the cause, they should sweat while they are exercising. Is it because

868 a

πότερον ὅτι πονούντων μὲν ὑπὸ τοῦ πνεύματος αἱ
 φλέβες ἐμφυσώμεναι τοὺς πόρους συμμεμυκέναι
 ποιούσι, παυσαμένων δὲ συνίζουσιν, ὥστε δι'
 εὐρυτέρων γινομένων τῶν πόρων ῥᾶον διέρχεται
 20 τὸ ὑγρὸν; ἢ ὅτι πονούντων μὲν ἀποκρίνει ἢ
 κίνησις ἐκ τοῦ συμπεφυκότητος ὑγροῦ πνεῦμα, καὶ
 διὰ θερμότητα τὴν ἀπὸ τῆς κινήσεως γίνεται τὸ
 ὑγρὸν πνεῦμα ἐπιπολῆς; ὅταν δὲ παύσῃται πονῶν,
 ἅμα καὶ ἡ θερμότης λήγει, καὶ ἐκ τοῦ πνεύματος
 25 πυκνουμένου ὑγρότης γίνεται, ὁ καλούμενος ἰδρῶς.

Πότερον δεῖ μᾶλλον τοῦ θέρους παρασκευάζειν 21
 τὸ ἰδρῶν ἢ τοῦ χειμῶνος; ἢ ὅτε μᾶλλον ὑγροὶ
 καὶ χαλεπώτεροι ἄνευ ἐπιμελείας γένοιντ' ἄν, ὥστε
 τοῦ θέρους¹ ἄν δεοί μᾶλλον, ἢ μεγάλη ἢ μεταβολή,
 30 καὶ τὰ περιπτώματα οὐ συνεκπέττεται. πάλιν
 ψυχθέντος ἔτι παρὰ φύσιν τὸ τοῦ χειμῶνος. δῆλον
 ἄρα ὅτι τοῦ θέρους μᾶλλον· καὶ γὰρ τὰ ὑγρά
 σήπεται μᾶλλον ἅπαντα τοῦ θέρους· διὸ τότε δεῖ
 ἀπαντλεῖν. διὰ τοῦτο δὲ καὶ οἱ ἀρχαῖοι πάντες
 οὕτως ἔλεγον.

35 Διὰ τί αἰεὶ τοῦ σώματος ῥέοντος καὶ τῆς ἀπορροῆς 22
 γινομένης ἐκ τῶν περιπτώματων οὐ κουφίζεται τὸ
 σῶμα, εἰ μὴ ἀφιδρώση; ἢ ὅτι ἐλάττων ἢ ἔκκρισις;
 ὅταν γὰρ ἐξ ὑγροῦ μεταβάλη εἰς ἀέρα, πλείον
 868 b γίνεται ἐξ ἐλάττωνος· τὸ γὰρ ὑγρὸν διακρινόμενον
 πλείον, ὥστε πλείονι χρόνῳ ἢ ἔκκρισις, διὰ τε
 τοῦτο καὶ ὅτι δι' ἐλαττόνων πόρων ἢ ἔκκρισις

¹ θέρους Forster : χειμῶνος Ruelle.

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while they are taking exercise the veins being inflated with air cause the pores to close up, but when the exercise is over the veins subside, so that the moisture more easily passes through the pores which then become wider? Or is it because during the exercise the movement separates the breath from the inherent moisture, and owing to the heat arising from movement the moisture becomes breath on the surface? But when they desist from exercise, the heat at once ceases, and moisture comes from the condensation of the breath, and this is called sweat.

Is it more important to produce sweating in the 21 summer than in the winter? Surely it is more important at the time when without due care men's bodies would become too moist and difficult to deal with, so that sweating would be more important in the summer, at a time when the bodily change is considerable, and the waste products less easily absorbed. Again, when the body is chilled, sweating in winter would be unnatural. Obviously, then, it is more important in summer; for all kinds of moisture are more liable to putrefy in the summer; that is, therefore, the time at which they need to be drained off. For this reason all men of old times expressed this opinion.

Why is it that, although the body has a continuous 22 flow and there is a regular efflux from the waste products, it never grows lighter unless it sweats? Is it because the outflow is too small? For when liquid condenses, much vapour is caused from a small quantity of liquid. For the liquid which is separated out is in greater quantity, so that the outflow takes longer time, for the reason given above and also because the outflow comes from narrower channels.

968 b

ἔστιν. ἔτι τὸ γλίσχρον καὶ τὸ κολλῶδες μετὰ
 5 μὲν τοῦ ὑγροῦ ἐκκρίνεται διὰ τὴν κατάμιξιν, μετὰ
 δὲ τοῦ πνεύματος ἀδυνατεῖ. μάλιστα δὲ τοῦτ'
 ἐστὶ τὸ λυποῦν. διὸ καὶ οἱ ἔμετοι τῶν ἰδρώτων
 κουφίζουσι μᾶλλον, ὅτι συνεξάγουσι τοῦτο ἅτε
 παχύτεροι καὶ σωματωδέστεροι ὄντες. καὶ ὅτι
 τῇ μὲν σαρκὶ πόρρω ὁ τόπος οὗτος, ἐν ᾧ τὸ
 γλίσχρον καὶ τὸ κολλῶδες, ὥστε ἔργον μεταστῆσαι,
 10 τῇ δὲ κοιλίᾳ ἐγγύς· ἢ γὰρ ἐν αὐτῇ ἐγγίνεται ἢ
 πλησίον· διὸ καὶ δυσεξάγωγον ἄλλως.

Διὰ τί ἤττον ἰδρουῖσιν ἐν αὐτῷ τῷ πονεῖν ἢ 23
 ἀνέντες; ἢ ὅτι πονοῦντες μὲν ποιοῦσιν, πεπονη-
 κότες δὲ πεποιήκασιν; εἰκότως οὖν ἐκκρίνεται
 15 πλέον· ὅτε μὲν γὰρ γίνεται, ὅτε δὲ ἐστίν. ἢ ὅτι
 πονούντων μὲν συγκλείονται τῆς σαρκὸς οἱ πόροι
 διὰ τὴν κάθεξιν τοῦ πνεύματος, ὅταν δ' ἀνώσιν,
 ἀνοίγονται; διὸ καὶ τὸ πνεῦμα κατέχοντες ἤττον
 ἰδρουῖσιν.

Διὰ τί οὐχὶ ὅταν τροχάζωμεν, ὁ ἰδρῶς πλείων, 24
 καὶ ὅταν ἐν κινήσει ἢ τὸ σῶμα, ἀλλ' ὅταν παύ-
 20 σωνται; ἢ ὅτι τότε μὲν ὥσπερ ὑπὸ τῆς χειρὸς ἢ
 ἄλλου τινος ἔστιν ὕδωρ ρέον ἀποφραῖσαι πανταχόθεν
 συναθροιζόμενον, ὅταν δὲ ἀφεθῇ, πλέον ἢ ὅσον ἐξ
 ἀρχῆς. ὡς δὲ ὑπὸ τῆς χειρὸς, οὕτω καὶ ὑπὸ τοῦ
 πνεύματος ἔστιν ἀποληφθῆναι, ὥσπερ ἐν τῇ κλεψ-
 ὑδρᾷ, καὶ πάλιν πρὸς τὴν κύστιν· ἀπολαμβάνει γὰρ
 25 ἐντός. ὁμοίως οὖν πολλῆς κινήσεως οὔσης τὸ
 πνεῦμα ἐναπολαμβάνεται· διὸ καὶ αἱ φλέβες δια-
 58

Again what is of a glutinous and viscous nature passes out together with the moisture, because it is mixed with it, but it cannot do so with the breath. It is particularly this viscous matter which causes pain. This is why nausea has a more lightening effect than sweat, because being thicker and more corporeal it carries out this viscous matter with it. A further reason is that the region containing this viscous and glutinous matter is far away relatively to the flesh, so that it is a hard matter to move it, but near to the stomach; in fact it forms in or near to it; consequently it is a difficult matter to remove it otherwise.

Why do we sweat less when actually taking exercise 23 than when we have ceased to do so? Is it because while taking exercise we are active, but after doing so we cease to be active? Naturally at this time it is given off in greater quantities. During the exercise the sweat is being formed, but when the exercise is over it is formed. Or is it because while men are exercising, the pores of the flesh are closed owing to the restraint of the breath, but when they cease exercise, the pores open? Hence they sweat less while they are restraining the breath.

Why is it that sweat is not more when we run fast 24 and the body is in movement, but when we have ceased exercise? Is it similar to what occurs with running water? When this is checked by the hand or other means it collects from all sides, and when it is released it flows in greater quantity than it did at the beginning. Sweat can be checked by the breath just as water can be checked by the hand, as in the water-clock and by pressure on the bladder; for this cuts it off within. Similarly when there is much movement the breath is checked; consequently

868 b

τείνονται τοῦ ὑγροῦ οὐ δυναμένου ἐξίεναι. ἀπο-
 λαμβανόμενον δὲ ἀθρόον τὸ ὑγρόν, ὅταν ἀνεθῆ
 τὸ πνεῦμα, ἀθρόον ἐξέρχεται.

Διὰ τί, ὅταν πίωσιν, ἦττον ἰδρουῦσιν ἐπιφαγόντες; 25
 30 ἢ διότι τὰ σιτία ἐπισπᾶται μὲν τὴν ὑγρότητα
 καθαπερὶ σπόγγος ἐμπεσών, ἔστι δὲ κωλύσαι τὴν
 ὄρμην οὐ μικρὸν μέρος, ὥσπερ ἐν τοῖς ρεύμασι, τῷ¹
 ἐπιλαβεῖν τοὺς πόρους προσενεγκάμενον τὴν τροφήν.

Διὰ τί οἱ ἀγωνιῶντες ἰδρουῦσι τοὺς πόδας, τὸ δὲ 28
 35 πρόσωπον οὐ; μᾶλλον γὰρ εὐλογον, ὅταν πᾶν
 ἰδρῶσι τὸ σῶμα, τότε μᾶλλον καὶ τοὺς πόδας·
 ψυχρότατος γὰρ ὁ τόπος, διὸ ἦκιστα ἰδρουῦσι. καὶ
 οἱ ἰατροὶ ἐν ταῖς ἀρρωστίαις μάλιστα περιστέλλειν
 τοὺς πόδας παραγγέλλουσιν, ὅτι εὐψυκτοὶ εἰσιν,
 869 a ὥστε ἀρχὴν ῥαδίως ῥίγους ποιοῦσι καὶ τῷ ἄλλῳ
 σώματι. ἢ ὅτι καὶ ἡ ἀγωνία ἐστὶ θερμότητος οὐ
 μετάστασις ὥσπερ ἐν τῷ φόβῳ ἐκ τῶν ἄνω τόπων
 εἰς τοὺς κάτω (διὸ καὶ αἱ κοιλίαι λύονται τῶν
 5 φοβουμένων), ἀλλ' αὕξησις θερμοῦ, ὥσπερ ἐν τῷ
 θυμῷ; καὶ γὰρ ὁ θυμὸς ζέσις τοῦ θερμοῦ ἐστὶ
 τοῦ περὶ τὴν καρδίαν· καὶ ὁ ἀγωνιῶν οὐ διὰ φόβον
 καὶ διὰ ψύξιν πάσχει, ἀλλὰ διὰ τὸ μέλλον.

Διὰ τί τὸ πρόσωπον ἐξέρυθροι γίνονται, οὐχ 27
 ἰδρουῦσι δέ; ἢ διὰ τὸ μᾶλλον θερμαίνεσθαι, ὥστε
 10 τὸ μὲν ἐν τῷ προσώπῳ ὑγρὸν ξηραίνει ἢ θερμότης
 ἐπιπολάζουσα, τὸ δὲ ἐν τοῖς ποσὶ συντήκει διὰ τὸ
 ἐλάττων μὲν εἶναι, πλείων δὲ τῆς ἐμφύτου καὶ
 προὑπαρχούσης;

Διὰ τί καθεύδοντες ἰδρουῦσι μᾶλλον ἢ ἐγρη- 28
 γορότες; ἢ ὅτι ἔσωθεν ἢ ἀρχὴ τοῦ ἰδρῶτος,
 15 θερμότερα δὲ τὰ ἐντός, ὥστε καὶ ἐκκρίνει διαχέουσα
 ἢ ἐντὸς θερμότης τὸ ἐντὸς ὑγρόν; <ἦ>² ὅτι αἰεὶ

¹ τῷ Forster : τὸ Ruelle.

² <ἦ> added by Bonitz.

the veins are distended with moisture which cannot escape. But being checked the moisture collects, and when the breath is released, it comes out in large quantity.

Why is it that when men drink, they sweat less if 25 they eat as well? Is it because the food absorbs the moisture, as if a sponge were put upon it, and it is possible to check the flow to a great extent, just as in streams by stopping the channels, by introducing food?

Why do men who are nervous sweat in the feet and 26 not in the face? For it would seem more reasonable that the feet should sweat more only at the time when the whole body sweats; for that part of the body is the coldest and therefore sweats least. Physicians give special instructions in disease to wrap up the feet, because they grow cold easily, so that at the beginning they readily cause shivering to the rest of the body. Is it because nervousness is not a transference of heat from the upper to the lower parts as happens in fear (and this is why the bowels are loosed when men are afraid), but is an increase of heat, such as takes place in anger? For anger is a boiling of the heat about the heart; and the man who is nervous is affected not by fear and chill, but by the future prospect.

Why do men grow red in the face without sweat- 27 ing? Is it because they grow more hot, so that the surface heat dries the moisture in the face, but melts that in the feet because it is less, though more than what naturally exists there beforehand?

Why do men sweat more asleep than awake? Is 28 it because sweat originates from within, and the parts within are warmer, so that the internal heat melts and expels the internal moisture? Or is it because

ἔοικεν ἀπορρεῖν τι τοῦ σώματος, ἀλλὰ διὰ τὸ μηθὲν εἶναι πρὸς ὃ προσπίπτον ἀλισθήσεται λανθάνει. σημεῖον δέ· τὰ γὰρ κοῖλα τοῦ σώματος αἰεὶ ἰδροῖ.

Διὰ τί ἐν τοῖς πυριατηρίοις μᾶλλον ἰδροῦσιν ὅταν ²⁰ ἢ ψυχρός; ἢ ὅτι τὸ θερμὸν οὐ βαδίζει ἔξω διὰ τὴν τοῦ ψυχροῦ περίστασιν (κωλύεται γὰρ ὑπὸ τούτου) ἀλλ' ἐντὸς κατειλούμενον καὶ μένον διαλύει τὰ ἐν ἡμῖν ὑγρά, καὶ ἰδρῶτα ποιεῖ ἔξ αὐτῶν.

Διὰ τί ὠφελιμώτερός ἐστιν ὁ ἰδρῶς, κἂν ἐλάττων ³⁰ ἐπέλθῃ, ὁ γυμνοῦ τροχάζοντος γενόμενος ἢ ὁ ἐν ἱματίῳ; ἢ τὸ μὲν πονεῖν τοῦ μὴ πονεῖν βέλτιόν ἐστι καθόλου, καὶ ὁ ἰδρῶς δὲ ὁ μετὰ πόνου τοῦ ἄνευ πόνου βελτίων ἐστί, καὶ ὁ μᾶλλον δὲ μετὰ πόνου τοῦ ἥττον βελτίων; μᾶλλον δ' ἐστὶ μετὰ πόνου ὁ γυμνοῦ τροχάζοντος γινόμενος· ἐὰν γὰρ ³⁰ μὴ πολλῇ συντονίᾳ τροχάσῃ, οὐ δύναται ἰδρῶσαι γυμνὸς ὢν· ἐν ἱματίῳ γὰρ κἂν πάνυ μετρίως τροχάσῃ, ταχὺ ἰδροῖ διὰ τὴν ἀπὸ τοῦ ἱματίου ἀλέαν. καὶ εὐχρύτεροι δὲ γίνονται οἱ γυμνοὶ τρέχοντες τοῦ θέρους τῶν ἐν ἱματίοις, ὅτι ὥσπερ ἅπαντες οἱ ἐν τοῖς εὐπνουστέροις τόποις οἰκοῦντες ³⁵ εὐχρύτεροί εἰσι τῶν ἐν τοῖς καταπεπνιγμένοις οἰκούντων, οὕτω καὶ αὐτὸς αὐτοῦ ὁ ἄνθρωπος, ὅταν ὥσπερ ἐν εὐπνοίᾳ ἢ, τότε εὐχρύτερός ἐστιν ἢ ὅταν καταπεπνιγμένος ἢ καὶ περιεχόμενος ὑπὸ ^{869 b} τινος ἀλέας πολλῆς, ὃ συμβαίνει μᾶλλον τῷ ἐν ἱματίῳ τρέχοντι. διὰ ταῦτα δὲ καὶ οἱ πολὺν χρόνον καθεύδοντες ἀχρύτεροί εἰσι τῶν μέτριον χρόνον καθευδόντων· καταπέπνικται γὰρ καὶ ὁ καθεύδων.

Διὰ τί οἱ ἀγωνιῶντες ἰδροῦσι τοὺς πόδας, τὸ δὲ ³¹

it is probable that something is always flowing off from the body, but it is unnoticed because there is nothing by falling on to which it will be collected. There is evidence for this ; the hollow parts of the body always sweat.

Why do men sweat more in vapour baths when the 29 weather is cold ? Is it because the heat cannot pass outside owing to the envelope of cold (for it is prevented by this), but is stored within, and remaining there dissolves the moisture within us and produces sweat from them ?

Why is sweat, even if it is in small quantity, more 30 beneficial if it comes from a rapid runner when naked than when wearing a coat ? Is it because generally speaking, exercise is better than no exercise, and so the sweat that arises from exercise is better than that which arises without exercise, and that which is due to greater exercise better than that which is due to less. The sweat of a naked runner is due to more exercise ; for unless he runs with violent exertion he cannot sweat if he is naked ; whereas, in a coat, even if he runs at a moderate pace, he very soon sweats, because of the heat due to the coat. Those who run naked in the summer get a healthier colour than those who run in coats ; just as all those who live in airy places have a healthier colour than those who live in stifling places. So also man himself has a healthier colour when he lives as it were in an airy place than when he is stifled and enveloped in considerable heat, which is the condition of a man who runs in a coat. This is also the reason why those who spend much time asleep have a less healthy colour than those who only sleep for a moderate time ; for when asleep a man is also stifled.

Why do the anxious sweat in the feet but not in 31

869 b

5 πρόσωπον οὐ, ἐν τῷ ἄλλῳ βίῳ ἰδρύντων ἡμῶν
 μάλιστα μὲν τὸ πρόσωπον, ἥκιστα δὲ τοὺς πόδας;
 ἢ ὅτι ἡ ἀγωνία φόβος τίς ἐστι πρὸς ἀρχὴν ἔργου,
 ὁ δὲ φόβος κατάψυξις τῶν ἄνω· διὸ καὶ ὠχριῶσι
 τὰ πρόσωπα οἱ ἀγωνιῶντες. κινουῦνται δὲ καὶ
 10 σκαίρουσι τοῖς ποσίν· ποιούσι γὰρ τοῦτο οἱ ἀγω-
 νιῶντες καὶ καθάπερ γυμνάζονται· διόπερ εἰκότως
 ἰδρουῖσι ταῦτα οἷς πονοῦσι καὶ τρίβουσι δὲ τὰς
 χεῖρας καὶ συγκαθιᾶσι καὶ ἐκτείνονται καὶ ἐξ-
 ἄλλονται καὶ οὐδέποτε ἡρεμοῦσιν· ὀρμητικοὶ γὰρ
 εἰσι πρὸς τὸ ἔργον διὰ τὸ τὸ θερμὸν αὐτῶν
 ἠθροῖσθαι εἰς τὸν περὶ τὸ στηῆθος τόπον ὄντα εὐ-
 15 σωματωδέστερον· ὅθεν πάντῃ διάττοντος αὐτοῦ τε
 καὶ τοῦ αἵματος συμβαίνει πυκνὴν καὶ ποικίλην
 γίνεσθαι κίνησιν. μάλιστα δὲ ἰδρουῖσι τοὺς πόδας,
 ὅτι οὗτοι μὲν συνεχῶς πονοῦσιν, τὰ δὲ ἄλλα μέρη
 τοῦ σώματος ἀναπαύσεως τυγχάνει ταῖς τῶν
 σχημάτων καὶ κινήσεων μεταβολαῖς.

20 Διὰ τί ἐν τοῖς πυριατηρίοις οὔτε ἀθροῦ τοῦ 32
 πυρὸς ὄντος μᾶλλον ἰδρουῖσιν, οὔτ' ἐλάττονος αἰ-
 γνομένου, ἀλλὰ πλείονος; ἐπεισφερομένου γὰρ
 <εἰς>¹ τὰ πυριατήρια μᾶλλον ἰδρουῖσιν ἢ εἴπερ εὐθύς
 ἐξ ἀρχῆς τοσοῦτον ἦν τὸ πῦρ. ἢ τὸ μὲν πολὺ ἐκ
 25 πρώτης ξηρὰν λαμβάνον τὴν ἐπιπολῆς σάρκα καὶ
 δέρμα καίει καὶ ὀστρακοῖ, γενομένη δὲ τοιαύτη
 στέγει τοὺς ἰδρῶτας. τὸ δὲ ὀλίγον μᾶλλον τὴν
 σάρκα ἀνιὲν αὐτὴν τε ἀραιοῖ, καὶ τὰ ἐντὸς καθάπερ
 ὀργάζει πρὸς τὴν διάκρισιν καὶ ἐξαγωγήν. οὕτω
 δ' ἐχούσης αὐτῆς, ἐπεισενεχθὲν πλεόν πῦρ καὶ
 30 εἰσδυόμενον εἰς βάθος τῆς σαρκὸς δι' ἀραιότητα
 ἐξατμίζει τε τὰ προμαλαχθέντα ὑγρά, καὶ τὰ

¹ <εἰς> added by Richards.

the face, whereas in ordinary life we sweat most in the face and least in the feet? Is it because an anxious condition implies an attitude of fear towards the beginning of an effort, and fear involves the cooling of the upper parts? Consequently, in states of anxiety men's faces grow pale. They move and dance on their feet; this is the way the anxious behave, like men taking exercise; naturally, therefore, they sweat in those parts which they exercise, and they rub their hands, stoop, stretch and fidget, and are never still; for they are eager for action owing to the heat which has collected about the chest, which is rather solid. As this heat and the blood rushes thence in all directions, the movement becomes considerable and varies. They sweat most in the feet, because these are continually active, but the other parts of the body get rest by the changes of position and movement.

Why do men sweat more in vapour baths, not when 32 the heat is applied all at once, nor when it is gradually reduced, but when it is gradually increased? For they sweat more when the heat is gradually introduced into the bath than if the same quantity of heat is applied at once from the start. Or does a large quantity of heat at the outset, finding the flesh dry on the surface, burn the skin, and make it hard like a shell, and, when in this condition, it holds the sweat? But in small quantities the heat loosens and rarefies the flesh and softens the parts within, as it were, with the result that the sweat separates and comes out. When the flesh is in this condition, more heat is introduced, and penetrating into the depth of the flesh owing to its rarity vaporizes the softened

869 b

λεπτὰ αὐτῶν ἀποκρίνον ἐξάγει μετὰ τοῦ πνεύματος.

Πότερον δεῖ μάλλον τοῦ θέρους παρασκευάζειν 33
τὸ ἰδρουῖν ἢ τοῦ χειμῶνος; ἢ τοῦ μὲν χειμῶνος
συστελλόμενον ἐντὸς τὸ θερμὸν ἐκπέττει καὶ
85 πνευματοῖ τὰ ἐν ἡμῖν ὑγρά, διὸ πάντων αὐτῶν ἢ
τῶν πλείστων ἀναλισκομένων οὐδὲν δεῖται συγ-
γενοῦς ἀποκρίσεως. τοῦ δὲ θέρους δι' ἀραιᾶς τῆς
σαρκὸς ἐκπίπτοντος τοῦ θερμοῦ ἤττον πέττεται τὰ
ἐν ἡμῖν ὑγρά· διὸ δεῖται ἀπαντλήσεως. ἐμμείναντα
870 a γὰρ διὰ τὴν ὥραν σήπεται καὶ νοσοποιεῖ. σήπεται
γὰρ πᾶν τὸ σηπόμενον ὑπ' ἀλλοτρίου θερμοῦ, ὑπὸ
δὲ τοῦ οἰκείου πέττεται. ἐν μὲν οὖν τῷ θέρει τὸ
ἀλλότριον ἰσχύει, διὸ σήπεται πάντα μάλλον ἐν
5 αὐτῷ, ἐν δὲ τῷ χειμῶνι τὸ οἰκεῖον· διὸ οὐ σήπει
ὁ χειμών.

Διὰ τί τῶν ἰδρώτων γινομένων ὑπὸ τῆς ἐντὸς 34
θερμασίας ἢ ὑπὸ τῆς ἐκτὸς προσπιπτούσης, πρὸς
ἐνίων ἰδρώτων φρίττομεν; ἢ διότι ὑπὸ μὲν τῆς
ἐντὸς θερμασίας ὅταν ἐκπίπτωσιν ἐκ πολλοῦ τόπου
10 εἰς ὀλίγον, συστελλόμενοι¹ πρὸς τὴν περιοχὴν
παντελῶς τὰς τοῦ θερμοῦ περιόδους ἀποφράττουσιν,
εἶτα ἢ φρίκη ἐγγίνεται; ἔτι τῆς σαρκὸς παντελῶς
διαβρόχου γινομένης καὶ τοῦ θερμοῦ διεξιόντος.
ἢ δὲ ἐκτὸς θερμασία προσπίπτουσα ἀραιοῖ τὸν
χρῶτα πρῶτον· εἶτα τὸ ἐντὸς τῆς φύσεως θερμὸν
ἀποκρινάμενον τὴν φρίκην ἐποίησεν.

15 Διὰ τί τῶν ἰδρώτων οἱ θερμοὶ κρίνονται βελτίους 35
εἶναι τῶν ψυχρῶν; ἢ ὅτι πᾶς μὲν ἰδρῶς περιτ-
τώματός τινος ἔκκρισις ἐστίν, εἰκὸς δὲ τὸ μὲν
ὀλίγον περίπτωμα ἐκθερμαίνεσθαι, τὸ δὲ πλεῖον μὴ
ὁμοίως, ὥστε ὁ ψυχρὸς ἰδρῶς πολλοῦ περιπτώματος

moisture, and separating the lighter parts expels them with the breath.

Is it more important to produce sweat in the 33 summer than in the winter? In the winter does the heat collecting within concoct and aerate the moisture within us? Hence as all or most of this is expended, there is no need of an appropriate method of expelling it. But in the summer, owing to the fineness of the flesh, when the heat comes out, the moisture within us is less concocted; so it needs drawing off. If it remains within, owing to the time of year it decays and causes disease. All that decays does so under the influence of extraneous heat, but by its own heat it is concocted. In the summer extraneous heat is strong; consequently all the moisture in the body decays the more, but in winter the natural heat is strong; so the winter does not cause decay.

Why is it that, though sweat is due either to internal 34 heat or to heat applied from without, we sometimes shiver when we sweat? Is it because, when sweat due to internal heat passes from a large area to a small one, it collects on the body's envelope and entirely blocks the passages of the heat, and hence shivering ensues? It is also because the flesh becomes permeated with moisture, and the heat flows out. Heat applied from the outside first rarefies the flesh; then the natural inward heat is expelled and causes shivering.

Why are hot sweats judged to be better than cold 35 ones? Is it because all sweat is the expulsion of some waste product and it is natural that a small amount of waste product should be hot, but a larger quantity not to the same extent, so that cold sweat

¹ συστέλλόμενοι Forster : συστέλλομένοις Ruelle.

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20 ἂν εἶη σημεῖον· διὸ καὶ μακροτέρας τὰς νόσους
δηλοῖ;

Διὰ τί τῶν ἰδρώτων διὰ θερμασίαν γινομένων 36
πρὸς τὸ πολὺ πῦρ ἤττον ἰδρῶμεν; ἢ διότι ἤτοι
σφόδρα θερμαινομένου τοῦ σώματος εἰς πνεύματα
ὑγρὰ διαλύεται, ἢ ἐκπίπτοντος τοῦ ὑγροῦ καὶ
25 ταχὺ περιξηραίνοντος τὴν αἴσθησιν οὐ λαμβά-
νομεν;

Διὰ τί τοῦ ἡλίου μᾶλλον θερμαίνοντος, ἂν μη- 37
δὲν περίβλημα ἔχωμεν, ἰδρῶτες γίνονται τοῖς
ἱματίοις περιστελλομένοις; καὶ περὶ τούτου ταῦτα
ἔροῦμεν τῷ προτέρῳ.

Διὰ τί τῶν ὀξειῶν κινήσεων μᾶλλον θερμαίνειν 38
30 δοκουσῶν, τῶν δὲ νωθρῶν ἤττον, αἰ πρὸς τὸ σιμὸν
πορεῖαι νωθρότεροι οὔσαι ἰδρῶτάς τε μᾶλλον
ἐκκρίνουσιν καὶ τὸ πνεῦμα προσιστᾶσιν, ὡς θερ-
μαίνουσαι μᾶλλον τῶν κατάντων; ἢ ὅτι τοῖς
βάρεσιν εἰς τὸ κάτω φέρεσθαι κατὰ φύσιν ἐστίν,
εἰς δὲ τὸ ἄνω παρὰ φύσιν; ἢ οὖν τοῦ θερμοῦ
35 φύσις ἢ φέρουσα ἡμᾶς πρὸς μὲν τὰ κατάντη οὐθὲν
συμπονεῖ, πρὸς δὲ τὰ σιμὰ φορτηγοῦσα διατελεῖ.
ὥστε διὰ μὲν τὴν τοιαύτην κίνησιν ἐκθερμαίνεται,
καὶ μᾶλλον τοὺς ἰδρῶτας ἐκκρίνει, καὶ τὸ πνεῦμα
870 b προσιστῆσιν. συμβάλλεται δέ τι ἐν ταῖς πορείαις
καὶ ἢ τοῦ σώματος σύγκαμψις πρὸς τὸ μὴ εὐθυ-
πορεῖν τὸ πνεῦμα προσιστᾶσα.

Διὰ τί τῶν ἰδρώτων γινομένων, ὅσω ἂν ἐπι- 39
βάλληται τις μᾶλλον, οὐχ οἱ τὰ πλείιστα τῶν
5 ἱματίων ἐπιβαλλόμενοι ἰδρῶσι; καὶ περὶ τούτου
ταῦτα ἔροῦμεν τῷ ἐπάνω.

Διὰ τί τῶν σωμάτων ξηροτέρων ὄντων τοῦ 40
θέρου ἢ τοῦ χειμῶνος, ἰδρωτικωτέρως διακείμεθα

would be evidence of much waste product? Hence it is an indication that illnesses are likely to last.

Why is it that, although sweat is due to heat, we 36 sweat less before a big fire? Is it because, when the body is very hot, it dissolves into moist vapour, or because, when moisture comes out and is quickly dried, we do not feel the sensation?

Why is it that, although the sun heats us more if 37 we wear no clothing, yet sweat comes ^a when we wear clothes? We shall give the same explanation as of the former problem.

Why is it that, though quick movements seem to 38 produce more heat, and sluggish ones less, yet a journey uphill, which is a more sluggish movement, produces more sweat and more laboured breathing, as though it caused more heat than walking downhill? Is it because heavy bodies move downwards naturally, but an upward movement is contrary to nature? Consequently, the nature of heat carrying us downhill is not subjected to strain, but going uphill it is continually carrying a burden. Owing to movement of this kind it therefore grows hot, and expels more sweat and strains the breathing. In walking also the bending of the body contributes to some extent to prevent the free passage of the breath by obstructing it.

Why is it that, although sweat is produced by 39 putting on more clothes, yet those who put on most clothes do not sweat most? We shall give the same answer to this problem as to the one above.^b

Why is it that, although bodies are drier in the 40 summer than in the winter, we are more disposed to

^a The missing words are supplied from Problem 9.

^b *i.e.* Problem 36.

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τοῦ θέρους; ἢ ὅτι τοῦ μὲν θέρους ἀραιῶν τῶν
 σωμάτων ὄντων τὸ τῆς φύσεως θερμὸν οὐ πολὺ
 10 κατέχεται; διαλύει οὖν τὰ ὑγρά εἰς πνεῦμα. τοῦ
 δὲ χειμῶνος πεπυκνωμένων ἐκτὸς τῶν σωμάτων,
 πολὺ κατειλημμένον τὸ τῆς φύσεως θερμὸν εἰς
 πνεῦμα οὐ διαλύει τὰ ὑγρά. ἔτι δὲ καὶ τοῦ μὲν
 θέρους πολὺ προσφερόμεθα τὸ ὑγρὸν, τοῦ χειμῶνος
 δὲ τοῦναντίον.

Διὰ τί οἱ ἀπὸ τοῦ αὐτομάτου γινόμενοι τοῖς 41
 15 ὑγιαίνουσιν ἰδρῶτες φαυλότεροι δοκοῦσιν εἶναι τῶν
 ὑπὸ τῶν πόνων; ἢ ὅτι οἱ μὲν πόνοι ἀπαντλοῦντες
 αἰεὶ τὸ περιττεῦον ὑγρὸν ξηροτέραν τὴν σάρκα παρα-
 σκευάζουσιν, ὥστε τὰς κοιλίας τῶν πόρων ὑγιεινὰς
 εἶναι καὶ τῇ τοῦ θερμοῦ ἠθίσει μηδεμίαν ἔμφραξιν
 20 γίνεσθαι, οἱ δ' αὐτόματοι μὲν προσαγορευόμενοι
 ἰδρῶτες, γινόμενοι δ' ἐξ ἀνάγκης, ὅταν ὑπὸ πλείονος
 ὑγρασίας συγχεομένων τῶν τῆς φύσεως πόρων τὰ
 θερμὰ μὴ παντελῶς καταλαμβάνηται, ἀλλ' ἔτι
 ἀπομάχεσθαι καὶ ἐκκρίνειν αὐτὸ δύνηται, εὐλόγως
 νόσου σημεία φαίνεται. τότε γὰρ ὑπὸ πλείονος
 25 ὑγρασίας ἢ τοῦ συμμέτρου κατὰ φύσιν ψύχεται,
 ἢ τε σὰρξ δίομβρος γενομένη τὴν κακίστην πρὸς
 ὑγίειαν διάθεσιν λαμβάνει.

Διὰ τί τοῦ χειμῶνος ἰδρῶτες ἦσσον γίνονται, καὶ 42
 ἡμεῖς οὐχ ὁμοίως παρασκευάζειν βουλόμεθα, ὑγρο-
 τέρων ὄντων τῶν σωμάτων τοῦ χειμῶνος; ἢ
 30 ἦσσον μὲν ἰδρουῦμεν, ὅτι τὰ ὑγρά τοῦ χειμῶνος
 πέπηγε καὶ συνέστηκε σφόδρα; δυσδιαλυτώτερα
 οὖν. οὐχ ὑπολαμβάνομεν δὲ δεῖν ἰδρωτοποιεῖσθαι
 τοῦ χειμῶνος, διότι ἢ τοιαύτη διάθεσις ὑγιεινή.
 ὁ δὲ τοὺς ἰδρῶτας ἐμποιῶν τήκει καὶ συγχεῖ τὴν
 ἔξιν· ἔτι τε καὶ ἀραιότεραν τοῦ προσήκοντος ἐμ-

sweat in the summer? Is it because in the summer, when bodies are in a rarefied state, the natural heat is not retained in large quantities? Therefore it dissolves the moisture into vapour. But in the winter, when bodies are thickened on the outside, the natural heat being enclosed in great quantities within does not dissolve the moisture. Also in the summer we introduce a large quantity of liquid into the body, but in the winter a small quantity.

Why is it that sweats that occur automatically with 41 the healthy are not held to be as good as those which are due to exercise? Is it because exercises which continually drain off the superfluous moisture make the flesh drier, so that the hollows of the pores are healthy and there is no obstruction to the draining off of the heat, but the sweats which are called automatic (and which are really necessary when the heat is not altogether controlled because the natural pores are disturbed by the great moisture, and moreover the heat can still compete with and expel the moisture), are rightly regarded as evidence of disease? For then the moisture being too great for a proper balance, the body is naturally chilled, and the flesh becoming soaked produces a condition most prejudicial to health.

Why is it that in winter sweats are less, nor do we 42 want to produce them to the same extent, although the body is moister in winter? Or do we sweat less, because in winter the moist parts grow firm and very solid? So they are less liable to be dissolved. We do not feel that it is necessary to induce sweat in the winter, because our condition at the time is healthy. But he who produces sweat causes melting and disturbs that condition; moreover, by making that condition rarer than it should be, he drives out the

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35 ποιῶν τό τε ἐντὸς θερμὸν ἀποκρίνων ἔλαττον ποιεῖ,
 ὥστε μὴ ὁμοίως δύνασθαι τῷ περιέχοντι ψυχρῷ
 ἀντιτετάχθαι· τό τε ἐκτὸς ὑγρὸν ῥαδιέστερον παρ-
 εμπεσεῖται τοῖς σώμασιν, ἀραιῶν τῶν πόρων διὰ τὰς
 ἰδρωτοποιίας ὄντων.

PROBLEMS, II. 42

natural heat and makes its quantity less, so that it cannot offer an equal resistance to the surrounding cold. Also the moisture outside will more easily penetrate the body, when the pores are rarer owing to the production of sweat.

ΟΣΑ ΠΕΡΙ ΟΙΝΟΠΟΣΙΑΝ ΚΑΙ ΜΕΘΗΝ

Διὰ τί οἱ μεθύοντες θερμοῦ ὄντος τοῦ οἴνου 1
 δύσριγοί εἰσιν, καὶ τάχιστα ἀλίσκονται ὑπὸ πλευρί-
 τιδος καὶ τῶν τοιούτων; ἢ διότι πολὺ ὑγρὸν ἐὰν
 5 ψυχθῆ, πολὺ ψυχρὸν γίνεται, ὥστε κρατεῖν τῆς
 φυσικῆς θερμότητος; γίνεται γὰρ ὅμοιον ὡσπερ-
 ανεὶ ἐσθῆς βεβρεγμένη εἴη ὑγρῷ ψυχρῷ, οὕτως
 ἢ σὰρξ ἔνδοθεν.

Διὰ τί οὐχ οἱ σφόδρα μεθύοντες παροινουῦσιν, ἀλλ' 2
 οἱ ἀκροθώρακες μάλιστα; ἢ ὅτι οὐθ' οὕτως ὀλίγον
 10 πεπώκασιν ὥστε ὁμοίως ἔχειν τοῖς νήφουσιν, οὐθ'
 οὕτως ὥστε διαλύεσθαι, ὅπερ πάσχουσιν οἱ πολὺ
 πεπωκότες; ἔτι οἱ μὲν νήφοντες μᾶλλον ὀρθῶς
 κρίνουσιν, οἱ δὲ σφόδρα μεθύοντες οὐδ' ἐγχειροῦσι
 κρίνειν· οἱ δὲ ἀκροθώρακες κρίνουσι μὲν διὰ τὸ μὴ
 σφόδρα μεθύειν, κακῶς δὲ διὰ τὸ μὴ νήφειν, καὶ
 15 ταχὺ τῶν μὲν καταφρονοῦσιν, ὑπὸ τῶν δὲ ὀλι-
 γωρεῖσθαι δοκοῦσιν.

Διὰ τί μᾶλλον κραιπαλῶσιν οἱ ἀκρατέστερον 3
 πίνοντες ἢ οἱ ὅλως ἀκρατον; πότερον διὰ τὴν
 λεπτότητα ὁ κεκραμένος μᾶλλον εἰσδύεται εἰς
 πλείους τόπους καὶ στενωτέρους, ὁ δὲ ἀκρατος
 20 ἦττον, ὥστε δυσεξαγωγότερος ὁ κεκραμένος; ἢ

BOOK III

ON WINE-DRINKING AND DRUNKENNESS

WHY, though wine is hot, are those who get drunk less 1 able to resist cold, and are very readily attacked by pleurisy and similar diseases? Is it because, if a quantity of liquid is cooled there is a quantity of cold, so that it masters the natural heat? This is the same as what occurs if a garment were soaked in cold water, for the flesh within becomes cold.

Why is it that those who are very drunk do not 2 behave badly, but those who are slightly drunk do? Is it because they have neither drunk so little that they still behave like the sober, nor so much as to become helpless, like those who have drunk a great deal? Again, the sober are more capable of making correct judgements, while the very drunk make no attempt to judge at all. But the slightly drunk do make judgements, because they are not so very drunk, but they make them badly because they are not sober, and readily despise some people and think that they are slighted by others.

Why do those who drink wine diluted have a worse 3 headache than those who drink it neat? Is it because diluted wine owing to its lightness penetrates farther into more and narrower regions, but unmixed wine to a less extent, so that the mixed wine is more difficult

871 a διότι ἐλάττω πίνουσι ἀκρατον διὰ τὸ μὴ δύνασθαι, καὶ ἀπεμοῦσι μᾶλλον; ἔτι δὲ συμπέττει τὰ λοιπὰ θερμότερος ὢν, καὶ αὐτὸς αὐτόν· ὁ δὲ ὑδαρῆς τοῦναντίον.

Διὰ τί τῶν οἰνοφλύγων τὸ σπέρμα οὐ γόνιμον 4 ὡς ἐπὶ τὸ πολὺ; ἢ ὅτι ἡ κρᾶσις τοῦ σώματος 25 ἐξύγρυνται; τὰ δὲ ὑγρά σπέρματα οὐ γόνιμα, ἀλλὰ τὰ συνεστῶτα καὶ πάχος ἔχοντα.

Διὰ τί οἱ οἰνόφλυγες τρέμουν, καὶ μᾶλλον ὅσω 5 ἂν ἀκρατοποτῶσιν; ἔστιν δὲ ὁ μὲν οἶνος θερμαντικόν, ὁ δὲ τρόμος γίνεται μάλιστα ἀπὸ ψυχροῦ· 30 διὸ οἱ ῥιγῶντες μάλιστα τρέμουν. πολλοῖς δ' ἤδη χρωμένοις μόνον ἀκράτῳ τροφῆς χάριν τρόμοι ἰσχυροὶ συνέβησαν, ὥστε ἀπορρίπτειν τοὺς θλίβοντας,¹ καὶ τῷ θερμῷ ὕδατι λουόμενοι ἀναισθήτως εἶχον. ἢ ὅτι γίνεται μὲν ὁ τρόμος διὰ κατάψυξιν, γίνεται δὲ ἢ περισταμένου ἐντὸς τοῦ θερμοῦ διὰ 35 τὸ ἐκτὸς ψῦχος, οἷον τοῦ χειμῶνος, ἢ σβεννυμένου τοῦ κατὰ φύσιν θερμοῦ, σβεννυμένου μὲν τῷ ἐναντίῳ, ἢ διὰ χρόνον, οἷον γῆρας, ἢ τῇ τοῦ ἀλλοτρίου θερμοῦ ὑπερβολῇ, ὃ συμβαίνει τῷ ἐν τῷ ἡλίῳ ἢ πυρὶ καιομένῳ. συμβαίνει δὲ τοῦτο καὶ τοῖς τῷ ἀκράτῳ οἴνω χρωμένοις. ὢν γὰρ θερμός τις, 871 b ὅταν ὑπερτείνῃ τῇ² δυνάμει τῇ τοῦ σώματος οἰκείᾳ θερμότητι μιγνύμενος, ἀποσβέννυσιν αὐτό· σβεσθέντος δὲ καὶ ψυχθέντος τοῦ σώματος συμβαίνει τοὺς τρόμους γίνεσθαι. ἔστιν δὲ καὶ παρὰ πάντα 5 τὰ εἰρημένα ἄλλος τρόπος καταψύξεως. ἀναιρεθείσης δὲ τῆς ὕλης, ἢ τὸ θερμὸν ἐκάστῳ τρέφεται, συμβαίνει καὶ τὸ θερμὸν φθείρεσθαι. τοῦτο δὲ ἐπὶ μὲν τῶν ἀψύχων ἐπὶ τοῦ λύχνου ἐστὶ φανερόν (τοῦ γὰρ ἐλαίου ἀναλωθέντος συμβαίνει σβέννυσθαι

to expel? Or is it because they do not drink so much unmixed wine because they cannot do so, and are more liable to be sick, (if they do)? Also unmixed wine being hotter causes digestion in other things and in itself; but watered wine has the opposite effect.

Why is the semen of drunkards generally not ⁴ reproductive? Is it because the bodily mixture has become moistened? Semen which is moist is not productive, but only that which is solid and has body.

Why do drunkards tremble, and especially when ⁵ they drink unmixed wine? Wine is a heating agent, and trembling comes mostly from cold; hence those who are very cold tremble most. But many who use no food except unmixed wine are seized with violent fits of trembling, so that they throw off those who hold them, and when they wash in hot water they do not feel it. Is it because trembling is due to chilling, and this is produced either when the internal heat is surrounded by cold outside (as in winter), or the natural heat is quenched, being quenched by its opposite, or owing to time (as by old age), or the excess of another heat, which happens to what is burning in the sun or in firelight? This also happens to those who use unmixed wine. For wine being hot, when, being mixed with the natural heat of the body, it exceeds it in power, quenches it; when the heat of the body is thus quenched and chilled, trembling occurs. But besides all that we have already said, there is another kind of chilling. When the matter wherewith the heat in each individual is fed has been removed, the heat itself must also be destroyed. In the inanimate world this is evident in the lamp (for when the oil is spent the light must be extinguished),

² ὑπερτείνῃ τῇ Bonitz : ὑπερτείνηται Ruelle.

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τὸ φῶς), ἐπὶ δὲ τῶν ἐμφύχων τό τε γῆρας ταῦτό
 10 ποιεῖ τοῦτο καὶ τῶν νόσων αἱ μακρὰ καὶ συν-
 τηκτικά. ἀναιρουμένης γὰρ ἢ λεπτυνομένης τῆς
 τοῦ θερμοῦ τροφῆς ἐκλύειν αὐτὸ συμβαίνει. ὑγρῶ
 μὲν γὰρ τρέφεται τὸ θερμόν, τούτῳ δὲ οὐ τῷ
 τυχόντι, ἀλλὰ λείω καὶ πίωνι.¹ διὸ τοῖς νοσοῦσι
 τὰς εἰρημένας νόσους καὶ πρεσβυτέροις φθειρο-
 15 μένου τοῦ τοιούτου καὶ ἀλλοιουμένου (δριμὺ γὰρ
 καὶ αὐχμηρὸν ἀντὶ λείου καὶ λιπαροῦ γίνεται)
 συμβαίνει ἐκλείπειν αὐτό. σημεῖον δὲ τῶν εἰρη-
 μένων ἐστὶν αἱ γινόμεναι βοήθειαι τοῖς μαράνσει
 τὸν βίον ἐκλείπουσιν· ὅ τι γὰρ ἂν ἐπιστάζῃ τις
 αὐτοῖς τῶν τροφωδῶν ὑγρῶν, προσαναφέρεσθαι
 20 συμβαίνει τὸ ζωτικόν² αὐτῶν, ὡς τῇ τοῦ τοιούτου
 ἐκλείψει γινομένης τῆς διαλύσεως. ἔοικεν δὲ τοῖς
 ἀκρατοποτοῦσι τοῦτ' εἶναι αἴτιον. ὦν γὰρ θερμὸς
 ὁ οἶνος μετὰ τῆς φύσει ὑπαρχούσης θερμότητος
 μᾶλλον ἀναλίσκει τὰ ἐν τῷ σώματι ὑπάρχοντα
 ἐφόδια τῷ οἰκείῳ θερμῷ. διὸ συμβαίνει τοὺς μὲν
 25 ὑδρωπικοὺς αὐτῶν γίνεσθαι, τοὺς δὲ ρευματικούς,
 τοὺς δὲ εἰς τὴν κοιλίαν. τά τε γὰρ λοιπὰ αὐτοῖς
 ὑγρὰ δριμέα ἐστίν, καὶ τὰ εἰσιόντα δι' ἀσθένειαν
 τοῦ οἰκείου θερμοῦ ἀπαλὰ ὄντα οὐ παχύνεται.
 ἀσθενὲς δὲ ἐστὶ τὸ θερμόν τῷ τὴν ὕλην εἶναι
 τοιαύτην ἐν ᾧ ἔτι σώζεται, καθάπερ τὸ καλάμινον
 30 πῦρ· καὶ γὰρ τοῦτο διὰ τὴν τῆς ὕλης ἀσθένειαν
 ἀσθενέστερόν ἐστι τοῦ ξυλίνου.

Διὰ τί οἱ μεθύοντες θερμοῦ ὄντος τοῦ οἴνου ὁ
 δύσριγοί εἰσι, καὶ τάχιστα ἀλίσκονται ὑπὸ πλευρί-
 τιδος καὶ τῶν τοιούτων νόσων; ἢ ὅτι τὸ πολὺ
 35 ὑγρὸν ἐὰν ψυχθῇ, πολὺ ψυχρὸν γίνεται, ὥστε

¹ πίωνι Bekker : πλείονι Ruelle.

but in the world of animate beings old age produces the same result, and so do long and wasting diseases. For when that which feeds the heat is removed or reduced, it must put an end to it. For heat is fed by moisture, not by any chance moisture, but by such as is smooth and thick. Hence in the case of those who are sick of the afore-mentioned diseases and older men, as this moisture decays and changes its character (for it becomes harsh and dry instead of being oily and thick), the heat fails. Evidence of what I have said is to be found in the things which help those whose life is failing by wasting; for if one supplies them with nutritive moisture, their vitality revives, so that their failing must be due to the lack of such moisture. This seems to be the cause with those who drink unmixed wine. For the wine being hot combined with the heat that is already there by nature expends the supply available in the body by its own heat. Consequently it happens that some become dropsical, others rheumatic, and with others the trouble descends to the abdomen. For the moisture remaining in them becomes bitter, and that which enters becomes soft because of the weakness of the natural heat and does not thicken. The heat is weak because the matter in which it is still contained is also of that character, like a fire fed by reeds; for this also because of the weakness of its matter is weaker than a wood fire.

Why are the drunken liable to cold, although wine is hot, and are especially liable to pleurisy and similar diseases? Is it because, if a large quantity of moisture is chilled, there is a large cold area, so that

² τὸ ζωτικὸν Richards: τὸ δὲ ὀπτικὸν Ruelle.

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κρατεῖ τῆς φυσικῆς θερμότητος. πάντα δὲ τὰ ὑγρότερα θερμότερά ἐστι τὴν φύσιν. σημεῖον δέ· θερμαίνεται μὲν γὰρ τοῖς ἐκτός, ὑγραίνεται δὲ οὐ. εἰ δ' ἥττον ἐστι θερμά, καὶ ἀπολείπει δῆλον ὅτι θάττον αὐτὰ ἢ θερμότης ἢ ὑγρότης, ὥστε λειφθέντων ψυχρῶν ὑγρῶν εἰκότως ῥιγοῦσίν τε μᾶλλον οἱ μεθύοντες καὶ τὰ τοῦ ῥίγους οἰκεία πάσχουσι πάθη.

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Διὰ τί οἱ μὲν παῖδες θερμοὶ ὄντες οὐ φίλοι οἱ εἰσι, Σκύθαι δὲ καὶ οἱ ἄνδρες οἱ ἀνδρεῖοι θερμοὶ ὄντες φίλοι; ἢ ὅτι οἱ μὲν θερμοὶ ὄντες καὶ ξηροί (ἢ γὰρ τοῦ ἀνδρὸς ἕξις τοιαύτη), οἱ δὲ παῖδες ὑγροὶ καὶ θερμοί; ἢ δὲ φιλοποσία ἐστὶν ἐπιθυμία ὑγροῦ τινός. ἢ οὖν ὑγρότης κωλύει διψητικούς εἶναι τοὺς παῖδας· ἔνδεια γὰρ τις ἐστὶν ἢ ἐπιθυμία.

Διὰ τί μεθύοντες μᾶλλον διαισθανόμεθα τὰ ἀλυκὰ καὶ τὰ μοχθηρὰ ὕδατα, νήφοντες δὲ ἥττον; ἢ ὅτι τὸ οἰκείον ὑπὸ τοῦ οἰκείου ἐστὶν ἀπαθές, καὶ τὸ ὁμοίως διακεείμενον, τὰ δὲ ἐναντία τῶν ἐναντίων ἐστὶν αἰσθητικώτατα; ὁ μὲν οὖν μεθύων γλυκεῖς ἐν αὐτῷ χυμοὺς ἔχει (τοιοῦτο γὰρ ὁ οἶνος δοκεῖ), καὶ τῶν φαύλων χυμῶν αἰσθητικώτερός ἐστιν, ὁ δὲ νήφων δριμεῖς καὶ ἀλυκοῦς. τῆς τροφῆς οὖν πεπεμμένης οἱ περιττωματικοὶ ἐπιπολάζουσιν. οὗτοί τε οὖν εἰσὶν ἀπαθεῖς ὑπὸ τῶν ὁμοίων, καὶ τὸν ἔχοντα ποιοῦσιν.

Διὰ τί τοῖς μεθύουσι σφόδρα κύκλω πάντα φαίνεται φέρεσθαι, καὶ ἤδη ἀπτομένης τῆς μέθης ἀθρεῖν τὰ πόρρω οὐ δύνανται; διὸ καὶ σημεῖον τῆς μέθης αὐτὸ ποιοῦνταί τινες. ἢ ὅτι κινεῖται ὑπὸ τῆς θερμότητος τοῦ οἴνου ἢ ὄψις πυκνάκεις; δια-

PROBLEMS, III. 6-9

it masters the natural warmth? Everything which is inclined to be damp is naturally warm. Here is a proof: heat is produced by external causes, but moisture is not. If, then, the heat grows less, obviously the heat fails more quickly than the moisture, so that, when the cold moisture remains, it is natural that the drinkers should shiver more and suffer from the usual symptoms of chill.

7 Why is it that children, who are warm, are not fond of wine, while Scythians and courageous men, who are also warm, are fond of wine? Is it due to the fact that the latter are hot and dry (for this is a characteristic condition of the man), but children are moist as well as hot? Now wine-drinking is a desire for something liquid. Their moisture, then, prevents children from being thirsty; for desire is in a sense the want of something.

8 Why are men more conscious of brackish and unpleasant water when they are drunk, but less so when they are sober? Is it because like and what is of similar nature is unaffected by like, but opposites are very sensitive to opposites? For the drunken man has in himself sweet savours (for this appears to be characteristic of wine), and so he is more conscious of unpleasant flavours, but the sober man has harsh and salt flavours in himself. So when the food is digested, the waste products rise to the surface. These, then, are unaffected by those like them, and make the subject so.

9 Why does everything appear to the very drunk to be travelling in a circle, and as soon as drunkenness has seized them they cannot see things far away? So some use this as a proof of drunkenness. Is it because the vision is frequently disturbed by the heat

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φέρει οὖν οὐθὲν τὴν ὄψιν κινεῖν ἢ τὸ ὀρώμενον·
ταῦτό γὰρ ποιεῖ πρὸς τὸ φαίνεσθαι τὰ εἰρημένα.
ἐπεὶ δὲ καὶ περὶ τὰ πλησίον ὄντα διαψεύδεσθαι τὴν
25 ὄψιν συμβαίνει τῶν μεθύοντων, καὶ περὶ τὰ πόρρω
μᾶλλον εἰκὸς ταῦτα πάσχειν. διόπερ ἐκεῖνα μὲν
ὄλως οὐχ ὀράται, τὰ δ' ἐγγὺς οὐκ ἐν ᾧ τόπῳ ἐστὶν
ὀρά. κύκλῳ δὲ φαίνεται φέρεσθαι, καὶ οὐκ ἐγγὺς
καὶ πόρρω, ὅτι εἰς μὲν τὸ πόρρω διὰ τε τὴν κύκλῳ
30 κίνησιν ἀδυνατωτέρα ἐστὶ φέρεσθαι ἢ ὄψις. ἅμα
γὰρ τὰναντία ποιεῖν οὐ ῥάδιον. ἔστι δὲ ἢ μὲν
πόρρω ἐπ' εὐθείας φορά,¹ ἢ δὲ κύκλῳ ἐν ᾧ τοῦνομα
σημαίνει σχήματι. διὰ τε οὖν τὰ εἰρημένα πόρρω
οὐ φέρεται· καὶ εἰ φέροιτο [τὸ] ἐγγὺς καὶ πόρρω,
οὐκ ἂν ταῦθ' ὀρώη. ἀπολείπει γὰρ ἂν ἐν θατέρῳ
35 χρόνῳ αὐτῶν τὸ ὀρώμενον ἐν ταῦτῳ τόπῳ, ἀπο-
λείπον² δὲ οὐκ ἂν ὀρώη. κύκλῳ δὲ φέρεται διὰ
τὸ ὑπάρχον σχῆμα τῆς ὄψεως. ἔστι γὰρ κῶνος,
οὗ ἢ βάσις κύκλος, ἐν ᾧ κινουμένη ὀρά μὲν τοῦτο
872 b διὰ τὸ μηδέποτε ἀπολείπειν αὐτό, διέψευσται δὲ
τῷ τόπῳ διὰ τὸ μὴ τὴν αὐτὴν ὄψιν ἐπιβάλλειν ἐπ'
αὐτό. ταῦτόν γὰρ ἂν ἦν ἢ τοῦτο πρὸς τὴν ὄψιν
κινεῖν ἢ τὴν ὄψιν πρὸς τοῦτο.

Διὰ τί τοῖς μεθύουσιν ἐνίοτε πολλὰ φαίνεται τὸ 10
b ἐν ὀρώσει; ἢ καθάπερ εἴρηται, κινουμένης τῆς
ὄψεως συμβαίνει μηθένα χρόνον τὴν αὐτὴν ἐπὶ
ταύτου ἠρεμεῖν ὄψιν; τὸ δ' ἐν ταῦτῳ χρόνῳ

¹ ἐπ' εὐθείας φορά Bonitz : ἐπιθυμία σφοδρά Ruelle.

² ἀπολείπον Richards : ἀπολείπων Ruelle.

of the wine ? It makes no difference, then, whether the vision or the object seen is disturbed ; either produces the same result in producing the phenomenon to which I have referred. Since, then, the vision of the drunk is liable to be deceived about near objects, it is natural that it should be more affected in this way about distant objects. Consequently, while distant objects are not seen at all, he sees near objects, but not in the place in which they are. They seem to travel in a circle, and not to be either near or far, because the vision is less able to travel into the distance owing to the movement in a circle. For it is not easy to perform opposite movements at the same time. Now there is a movement of the vision in a straight line towards the distance, but movement in a circle is confined to the figure implied by its name. The vision, therefore, does not travel to the distance owing to the reasons given ; if the vision were to travel to both near and distant objects, it could not see both these. For that which was seen in the same place would fail at the next instant, and if it failed the man could not see it. Vision travels in a circle owing to the natural formation of the sight. For it is a cone, the base of which is a circle, moving in which the eye sees the one object because it never fades, but is deceived as to its position because the same glance does not strike it. For moving the object towards the sight and moving the sight towards the object is the same thing.

Why is it that, to men who are drunk, the one often 10 seems to be many ? Is it, as we have said above, because, the sight being disturbed, the same vision can never remain on the same spot for any time ? But that which is seen in a different way at the same

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ἑτέρως ὁρώμενον ὀψιαίτερον εἶναι δοκεῖ· ἀφῆ γὰρ ὄψεως ὁράται τὸ ὁρώμενον, ἄπτεσθαι δὲ πλείοσιν ἅμα τοῦ αὐτοῦ ἀδύνατον. ὄντος δὲ ἀναισθήτου τοῦ
 10 μεταξὺ χρόνου, ἐν ᾧ ἢ ὄψις ἤπτετο καὶ παρ-
 ἤλλαττει τὸ ὁρώμενον, εἰς εἶναι δοκεῖ χρόνος ἐν ᾧ
 τε ἤπται καὶ παρήλλαχεν· ὥστ' ἐν τῷ αὐτῷ χρόνῳ
 ταύτου πλειόνων ἀπτομένων ὄψεων πλείω δοκεῖ
 εἶναι τὰ ὁρώμενα, διὰ τὸ ταῦτα κατὰ τὸν αὐτὸν
 τρόπον ἀδύνατον εἶναι ἄπτεσθαι.

15 Διὰ τί οἱ μεθύοντες ἀφροδισιάζειν ἀδύνατοί εἰσιν; 11
 ἢ ὅτι δεῖ τινὰ τόπον ἐκθερμανθῆναι μᾶλλον τοῦ
 αλλοῦ σώματος, τοῦτο δὲ ποιεῖν διὰ τὸ πλῆθος τῆς
 ἐν ὄλῳ τῷ σώματι θερμασίας ἀδυνατοῦσιν; ἀπο-
 σβέννυται γὰρ τὸ ὑπὸ τῆς κινήσεως γινόμενον θερμὸν
 20 ὑπὸ τοῦ περιέχοντος μᾶλλον, ὅτι πολὺ ἐστὶν ἐν
 αὐτοῖς τὸ ὑγρὸν καὶ ἄπεπτον. ἔτι δὲ τὸ σπέρμα
 ἐκ τροφῆς, τροφή δὲ πᾶσα πέττεται· ἧς πληρω-
 θέντες ὀρμητικοί εἰσι πρὸς τὰ ἀφροδίσια. διὸ καὶ
 κελεύουσί τινες πρὸς τὴν πράξιν τὴν τοιαύτην
 ἀριστᾶν μὲν πολὺ, δειπνεῖν δὲ ὀλίγον, ἵνα ἢ αὐτοῖς
 ἐλάττω τὰ ἄπεπτα τῶν πεπεμμένων.

25 Διὰ τί ὁ γλυκὺς καὶ ὁ ἄκρατος καὶ ὁ κυκεὼν 12
 μεταξὺ διαπινόμενοι ἐν τοῖς πότοις νήφειν ποιοῦσιν;
 καὶ διὰ τί ἤπτον μεθύσκονται ταῖς μεγάλαις κω-
 θωνιζόμενοι; ἢ πάντων τὸ αὐτὸ αἰτιὸν ἐστίν, ἢ
 30 παράκρουσις τοῦ ἐπιπολῆς θερμοῦ; τὸ γὰρ μεθύειν
 ἐστίν, ὅταν ἢ τὸ θερμὸν ἐν τοῖς περὶ τὴν κεφαλὴν
 τόποις.

Διὰ τί τοῦ γλυκέως ἐπιπολαστικοῦ ὄντος, εἰάν 13
 τις μεθύων ἤδη ἐπιπίη γλυκὺ, καταπέττεται ὁ

PROBLEMS, III. 10-13

moment seems to be later in time ; for that which is visible is seen by contact with the sight, and it is impossible for sight to have contact with several things at the same time. But as the intervening time, while the sight was in contact with and passed on from the object seen, is imperceptible, the time in which it has been in contact and passed on from its object appears to be a single moment ; so that, when more than one glance is in contact with the same thing at the same time, the objects seen appear to be more than one, because it is not possible for them to be in contact in the same way.

Why cannot the drunken have sexual intercourse ? 11
Is it because to this end one part of the body must be heated more than the rest, and this they cannot do owing to the quantity of heat in the whole body ? For the heat generated by the movement is extinguished by the greater heat surrounding it, because there is much undigested moisture in drunken men. Again, semen arises from food and all the food is digested ; when sated with food we are more prone to sexual appetite. Hence some lay down that for this purpose we should breakfast well but dine sparingly, in order that the undigested food may be less than the digested.

Why is it that sweet or unmixed wine or mead 12 when consumed in between drinking makes a man sober ? And why are men less drunk when they drink in large draughts ? Is the cause of all these the same, namely the checking of the heat on the surface ? For drunkenness occurs when the heat is in the region about the head.

Why is it that, although the sweet rises to the sur- 13 face, if an already drunken man drinks sweet wine on

ARISTOTLE

872 b ἐνυπάρχων οἶνος καὶ ἤττον ἐνοχλεῖ; ἢ ὅτι τὸ μὲν
 35 γλυκὺ λεαιτικόν τέ ἐστι καὶ γλίσχρον (ἐμφράττει
 οὖν τοὺς πόρους), τὸ δὲ αὐστηρὸν τραχυντικόν; καὶ
 τὸ μὲν εὐπετῆ ποιεῖ τῷ θερμῷ τὴν ἀναφοράν, ὃ δὲ
 873 a γλυκὺς στέγει αὐτό, τοὺς πόρους ἐμφράττων. ὅτι
 δὲ τῶν ἄνω θερμανθέντων ἐστὶν ἢ μέθη, εἴρηται.
 ἔτι δὲ ὃ μὲν γλυκὺς ἀνοδμος, ὃ δὲ αὐστηρὸς οὐ-
 ὄσμη δὲ πᾶσα βαρύνει κεφαλὴν.

Διὰ τί ἀπὸ τοῦ κεκραμένου μὲν, ἀκρατεστέρου 14
 5 δὲ ἔωθεν μᾶλλον πονοῦσι τὴν κεφαλὴν ἢ ἀπὸ τοῦ
 ἀκράτου; ἢ ὅτι ὃ μὲν ἀκρατος παχυμερῆς ὢν εἰς
 τοὺς περὶ τὴν κεφαλὴν πόρους στενοὺς ὄντας,
 αὐτὸς μὲν οὐκ εἰσπίπτει, ἢ δὲ δύναμις αὐτοῦ, ἢ
 ὄσμη καὶ θερμότης· ὃ δὲ κεκραμένος μιχθεὶς λεπτῷ
 10 τῷ ὕδατι αὐτὸς εἰσδύεται, ἔχων δὲ σῶμα, καὶ τῆς
 δυνάμεως πολὺ τῆς τοῦ ἀκράτου, δυσπεπτότερός
 ἐστίν. τά τε γὰρ ὑγρὰ πάντων δυσπεπτότατα, καὶ
 τὰ σώματα τῶν ἐν αὐτοῖς δυνάμεων.

Διὰ τί μᾶλλον δύνανται πιεῖν εἰς μέθην οἱ 15
 ἀγύμναστοι τῶν γεγυμνασμένων, καὶ ῥᾶον ἀπαλλάτ-
 15 τουσιν; ἢ ὅτι οἱ ἔχοντες περίπτωμα καὶ ὑγρὸν
 ἐν αὐτοῖς οὐρητικοὶ γίνονται· ὅπερ ποιεῖ δύνασθαι
 πίνειν καὶ ὕστερον κούφως ἔχειν διὰ τὸ μὴ ἐμ-
 μένειν πολὺ ὑγρὸν οἰνώδες. οἱ μὲν οὖν ἀγύμναστοι
 ὑγροὶ καὶ περιπτωματικοὶ εἰσιν, οἱ δὲ γεγυμνα-
 σμένοι ξηροί, ὥστ' εἰς τὸ σῶμα τούτοις ἢ ὑγρότης
 20 ἢ οἰνηρὰ ἀφικνεῖται. εὐθύς τε οὖν ἀντισπᾶ τῇ
 οὐρήσει ἢ φορὰ αὕτη, καὶ ὕστερον ἐμμένον τὸ
 ὑγρὸν τοῦτο ἐν τῷ σώματι βάρος ποιεῖ.

Διὰ τί ὁ οἶνος καὶ τετυφωμένους ποιεῖ καὶ μανι- 16
 κούς; ἐναντία γὰρ ἢ διάθεσις· ὃ μὲν γὰρ μᾶλλον

PROBLEMS, III. 13-16

top, the wine which is already there is digested and causes less disturbance? Is it because what is sweet produces softening and viscosity (hence it obstructs the pores), but the bitter produces roughness? The latter, therefore, makes it easy for the heat to rise, but the sweet keeps it down, by blocking the pores. We have already said that drunkenness is due to heating above. Sweet wine, again, is scentless, but bitter wine is not, and every scent makes the head heavy.

Why do men have a worse headache in the morning ¹⁴ from wine which is mixed but not much diluted, than from unmixed wine? Is it because unmixed wine has thick parts and so cannot itself pass into the channels about the head which are narrow, but its power does, that is the scent and warmth; but mixed wine being mingled with light water passes in itself, and, having body and much of the power of unmixed wine, is less easily concocted? For moist things are the most difficult to concoct, and substances are more difficult to concoct than their effects.

Why do men who take no exercise more readily ¹⁵ drink to a condition of drunkenness than those who take exercise, and more easily throw it off? Is it because those who have waste products and moisture within them are prone to pass water? This makes them able to drink and afterwards to be relieved because much vinous fluid does not remain. Now those who do not take exercise are moist and full of waste products, but those who take exercise are dry, so that vinous fluid passes into the body. Its course at once checks the water, and later this moisture, remaining in their bodies, causes weight.

Why does wine make men both dull and insane? ¹⁶ For these are opposite conditions. The latter involves

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25 ἤδη ἐν κινήσει, ὁ δὲ ἤττον. ἢ ὥσπερ Χαιρήμων
 εἶπεν· “ τῶν χρωμένων γὰρ τοῖς τρόποις κεράν-
 νυται” ; τὰναντία οὖν ποιεῖ οὐ ταυτά, ἀλλὰ τὰ μὴ
 ὁμοίως ἔχοντα, ὥσπερ καὶ τὸ πῦρ τὰ μὲν ξηραίνει,
 τὰ δὲ ὑγραίνει, ἀλλ’ οὐ ταυτά, καὶ τήκει τὸν κρύ-
 σταλλον καὶ πήγνυσι τοὺς ἄλας. καὶ ὁ οἶνος
 30 (ὑγρὸς γὰρ ἐστὶ τὴν φύσιν) τοὺς μὲν βραδυτέρους
 ἐπιτείνει καὶ θάπτους ποιεῖ, τοὺς δὲ θάπτους ἐκλύει.
 διὸ ἔνιοι τῶν μελαγχολικῶν τῇ φύσει ἐν ταῖς
 κραιπάλαις ἐκλελυμένοι γίνονται πάμπαν. ὥσπερ
 γὰρ τὸ λουτρὸν τοὺς μὲν συνδεδεμένους τὸ σῶμα
 35 καὶ σκληροὺς εὐκινήτους ποιεῖ, τοὺς δὲ εὐκινήτους
 καὶ ὑγροὺς ἐκλύει, οὕτως ὁ οἶνος, ὥσπερ λούων
 τὰ ἐντός, ἀπεργάζεται τοῦτο.

Διὰ τί ἡ κράμβη παύει τὴν κραιπάλην; ἢ ὅτι 17
 873 b τὸν μὲν χυλὸν γλυκὺν καὶ ῥυπτικὸν ἔχει (διὸ καὶ
 κλύζουσιν αὐτῷ τὴν κοιλίαν οἱ ἰατροί), αὐτὴ δ’
 ἐστὶ ψυχρά; σημεῖον δέ· πρὸς γὰρ τὰς σφοδρὰς
 διαρροίας χρῶνται αὐτῇ οἱ ἰατροί, ἔψοντες σφόδρα
 5 καὶ ἀποχυλίζοντες¹ καὶ ψύχοντες. συμβαίνει δὲ
 τῶν κραιπαλώντων τὸν μὲν χυλὸν αὐτῆς εἰς τὴν
 κοιλίαν κατασπᾶν τὰ ἐν αὐτοῖς ὑγρά, οἴνηρά καὶ
 ἄπεπτα ὄντα, αὐτὴν δὲ ὑπολειπομένην ἐν τῇ ἄνω
 κοιλίᾳ ψύχειν τὸ σῶμα. ψυχομένου δὲ ὑγρά λεπτὰ
 συμβαίνει εἰς τὴν κύστιν φέρεσθαι, ὥστε κατ’
 10 ἀμφοτέρα τῶν ὑγρῶν ἐκκρινομένων διὰ τοῦ σώ-
 ματος, καὶ καταψυχομένου, εἰκότως ἀκραιπάλοι
 γίνονται· ὁ γὰρ οἶνος ὑγρὸς καὶ θερμὸς ἐστίν. ἔτι
 δὲ συμβαίνει τῶν ὑγρῶν κατασπασμένων καὶ
 ἐκκρινομένων κάτω καὶ πνεῦμα ἐπάγεσθαι αὐτοῖς,
 ὅθεν μόνον ἀπὸ τοῦ οἴνου εἰς τὴν κεφαλὴν φερόμενον
 15 τὸν κάρον καὶ τὴν κραιπάλην ποιεῖ. κάτω δὲ

more movement, the former less. Is it as Chaeremon said, "Wine amalgamates with the character of the user"? It therefore produces opposite results not on the same things, but upon dissimilar things; just in the same way fire produces both dryness and moisture, but not upon the same things—for instance it melts ice and hardens salt. So also wine (for it is by nature moist) stiffens up the slow and makes them faster, but relaxes the quick. So some of those who are melancholic by nature becomes entirely relaxed in drunkenness. Just as a bath makes those who are stiff in body and hard more able to move, and relaxes those who move easily and are moist, so wine, which in a sense bathes the inside, produces the same effect.

Why does cabbage prevent headache after drinking? ¹⁷ Is it because it has a sweet and purgative sap (and so physicians wash out the abdomen with it), and it is naturally cold? Here is the evidence: doctors use it in severe cases of diarrhoea, boiling it thoroughly, and then drawing off the juice and cooling it. In the case of those who are suffering from headache after drink, the juice of the cabbage descends into the stomach and draws off the moisture, which is vinous and unconcocted, and remaining itself in the upper abdomen it cools the body. As it cools, moist and light parts descend into the bladder, so that in these two ways the moisture is carried through the body, and as the body grows cool, men naturally cease to have a headache; for wine is wet and hot. A further result of the drawing off and separation of this moisture is that the breath is carried down to these parts, from which alone, being carried from the wine up into the head, it produces torpor and headache. But as

¹ ἀποχυλίζοντες Sylburgh: ἀποξυλίζοντες Ruelle.

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ὀρμήσαντος καὶ καταψυχομένου τοῦ σώματος διὰ
τὰ εἰρημένα, λύεται ὁ τῆς κραιπάλης πόνος. ἔστι
γὰρ ἢ κραιπάλη ζέσις τις καὶ φλεγμασία λήγουσα.
λυπεῖ δὲ μᾶλλον τῆς μέθης, ὅτι ἐκείνη μὲν ἐξ-
ίστησιν, ἢ δὲ κραιπάλη ἐν ἑαυτοῖς οὔσι τὸν πόνον
20 παρέχει· καθάπερ οὖν καὶ ὑπὸ τῶν πυρετῶν οἱ
λαμβάνομενοι παίζουσι μᾶλλον ἢ ἀλγοῦσι, παρ'
αὐτοῖς δὲ γενόμενοι οἱ αὐτοί, κουφισθέντες τοῦ
πάθους, ἀλγοῦσιν. ταῦτά γὰρ καὶ ἐπὶ τῆς κραι-
πάλης καὶ ἐπὶ τῆς μέθης συμβαίνει.

Διὰ τί μᾶλλον ἐμετιᾶν ποιεῖ ὁ ὑδαρῆς οἶνος ἢ τὸ 18
25 ὕδωρ καὶ ὁ ἄκρατος; ἢ ὅτι ἐμεῖν μὲν μάλιστα
ποιεῖ τὰ ἐπιπολαστικά καὶ ὅσα ἀηδῆ ἐστίν; ἔστι
δὲ ὁ μὲν οἶνος κατακρουστικός, τὸ δὲ ὕδωρ λεπτὸν
καὶ οὐκ ἀηδές. διὰ μὲν οὖν τὸ λεπτὸν καὶ οὐκ
ἀηδές εἶναι κάτω διέρχεται ταχύ, διὰ δὲ τὸ μὴ
ἀηδές οὐ ποιεῖ καρδιώττειν. ὁ δὲ κεκραμένος λίαν
80 οὐκ ἔστι λεπτός ὥστε διαρρεῖν ταχύ, διὰ δὲ τὸ
μικρὸν ἔχειν οἴνου ἀηδῆς ἐστίν· ταραττει γὰρ τὴν
αἴσθησιν τῷ πλείους ἐν αὐτῇ κινήσεις ἐμποιεῖν,
τὴν τ' ἀπὸ τοῦ οἴνου καὶ τοῦ ὕδατος· αἰσθηταὶ γὰρ
ἄμφω γίνονται. ὁ δ' εὐκράτος τὴν μὲν τοῦ ὕδατος
85 αἴσθησιν ἀφανίζει, οἴνου δὲ μαλακοῦ ποιεῖ αἴσθησιν·
διὸ ἠδέως πίνεται. ἀηδῆς δὲ ὢν ὁ ὑδαρῆς οἶνος
ἐπιπολαστικός ἐστίν· τὸ δὲ τοιοῦτον ἐμετικόν
ἐστίν.

Διὰ τί μεθύοντες μᾶλλον διαισθανόμεθα τὰ ἀλυκὰ 19
874 a καὶ τὰ μοχθηρὰ ὕδατα, νήφοντες δ' ἠττον; ἢ ὅτι
τὰ λυπηρὰ μᾶλλον δῆλα τοῖς μὴ ἐπιθυμοῦσι, τοὺς
90

the breath travels downwards and the body is cooled in the way described, the pain of the headache passes away. For the headache is due to boiling in a sense, and to an inflammation as it grows less. This headache is more uncomfortable than mere drunkenness, because the latter makes men mad, but the headache causes them pain, while they are still in full possession of their senses. Just in this way men who are attacked by fevers are amused rather than in pain, but when they come to themselves again and are freed from their disease, they feel pain. The same thing is true of headache after drinking and drunkenness.

Why does wine mixed with water make a man sick 18 more easily than either water or unmixed wine? Is it because nausea is produced by what comes to the surface and is unpleasant to taste? Now wine has a repressive effect, but water is light and not unpleasant. Because it is light and not unpleasant it passes through quickly, and because it is not unpleasant it does not cause stomach-ache. But over-mixed wine is not sufficiently light to pass through quickly, but is unpleasant because it contains little wine; it confuses the perception because it produces more than one movement in it; one due to the wine and one to the water; for both are perceptible. But well-mixed wine obscures all perception of water, and only gives a sensation of soft wine; hence it is drunk with pleasure. But watery wine being unpleasant rises to the surface, and such wine produces sickness.

Why are we more conscious of brackish and un- 19 pleasant water when we are drunk and less so when we are sober? Is it because unpleasant things are more obvious to those who are not in a state of desire, but

874^a δ' ἐπιθυμοῦντας διαλανθάνει; ὁ μὲν οὖν ἐνδεῶς¹
 ἔχων ὁμοίως τῷ ἐπιθυμοῦντι ἔχει, ὁ δὲ νήφων
 οὕτως ἔχει· ὁ δὲ μεθύων πλήρης.

5 Διὰ τί τοῖς μεθύουσι σφόδρα κύκλω πάντα φαί- 20
 νεται φέρεσθαι, καὶ ἤδη ἀπτομένης μᾶλλον τῆς
 μέθης ἀριθμεῖν τὰ πόρρω οὐ δύνανται; διὸ καὶ
 σημεῖον τῆς μέθης ποιοῦνται αὐτό τινες. ἢ ὅτι
 κινεῖται ὑπὸ τῆς θερμότητος τοῦ οἴνου ἢ ὄψις
 πυκνάκις; ὥσπερ οὖν ὅταν ὑποθῆ *<τί>*² τις ὑπὸ τὸν
 10 ὀφθαλμόν, δύο φαίνεται, οὕτω καὶ τοῖς μεθύουσιν.
 οὐθὲν γὰρ διαφέρει, εἴ μὲν ὑποθῆ, κινῆ δὲ τὴν
 ὄψιν, οὐδ' εἴ μὲν ἔξωθεν ἢ ἔσωθεν· ἀμφοτέρως γὰρ
 τὸ αὐτὸ πάσχει ἢ ὄψις. ὥστε οὐ δόξει μένειν τὸ
 ὀρώμενον, καὶ τὸ πόρρωθεν ἔτι μᾶλλον· ἔτι γὰρ
 ἦττον κρατεῖ ἀποτεινομένης τῆς ὄψεως, καὶ πλέον
 15 τὸ διάστημα ἐπὶ τῷ ἄκρῳ ποιεῖ ἢ ἐγγὺς αὕτη
 κίνησις. ἂν δὲ σφόδρα κινῆται καὶ ὀμαλῶς ἄνω
 καὶ κάτω, ἦττον κρατήσῃ τοῦ πόρρω. πάντα δὲ
 ἀποτεινόμενα κύκλω φέρεται, οἷον οἱ ἴστοι³ καὶ
 τὰ καταρτώμενα. καὶ ἢ ὄψις οὖν δι' ἀσθένειαν
 ταῦτ' ὀρώμενον ὥσπερ ἂν εἰ πόρρω ἐφέρετο. δια-
 20 φέρει δ' οὐθὲν τὴν ὄψιν κινεῖν ἢ τὸ ὀρώμενον· ταῦτ'
 γὰρ ποιεῖ πρὸς τὸ φαίνεσθαι.

Διὰ τί, ὅταν ἀθρόως πίνωσι, ξηρότεραι αἱ κοιλίαι 21
 γίνονται, ὅτε δεῖ ὑγραίνεσθαι μᾶλλον ὑπὸ τοῦ
 πλείονος; ἢ ὅτι τοῦ μὲν πολλοῦ καὶ ἀθρόου οὐ

¹ ἐνδεῶς Bonitz : ἠδέως Ruelle.

² *<τί>* added by Richards.

PROBLEMS, III. 19-21

are not noticed by those who are? So the man who is in want is like the man who desires, and the sober man is in this state; but the drunken man is satisfied.

Why is it that to the very drunk everything seems to travel in a circle, and that, as drunkenness gets more hold, men cannot count objects at a distance? For this reason some make this a test of drunkenness. Is it because the vision is continually distorted by the heat of the wine? Just as when one places an object close under the eye, it appears to be two, so also with the drunk. For it makes no difference whether you put an object under the eye, or move the eye to it, nor does it matter whether the movement is from outside or from inside; for the sight suffers the same effect in both cases. So that the object seen will not seem to be stationary, and the farther it is away the more true this is; for when the vision is directed to a distance the object has less control of it, and this movement which exists with the near object produces even more effect at the limit of vision. If, then, the eye is moved violently and regularly up and down, it will have less control over the distant object. Everything which is extended to a distance, therefore, moves in a circle, for example masts and objects in suspension. And the sight, because of its weakness, is affected in the same way as if it were carried to a distance. It makes no difference whether the vision or the object seen is moved; from the point of view of appearance the effect is the same.

Why is it that when men drink a large quantity at once the stomach becomes drier, whereas it ought to become more moist owing to the larger quantity of liquid? Is it because the stomach does not hold a

³ *ἴστοι* some MSS. : *ὀἴστοι* Ruelle.

874 a

25 κρατεῖ ἢ κοιλία, ἀλλ' εἰς τὸν αὐτοῦ ἔρχεται τόπον ἀπαθές; ἔστιν δὲ ὑγροῦ τόπος ἀπέπτου ἢ κύστις. τοῦ δὲ ὀλίγου κρατεῖ καὶ πέττει, ὥστε μένον ὑγραίνει.

Διὰ τί μᾶλλον κραιπαλῶσιν οἱ εὐκρατον πίνοντες 22 ἢ οἱ ἄκρατον; ἢ διὰ τὴν λεπτότητα εἰς πλείους 30 τόπους ὁ κεκραμένος εἰσέρχεται, καθάπερ ἐν τοῖς ἱματίοις, καὶ ἔστι δυσεξαγωγότερος; τὸ δὲ ὕδωρ λεπτομερέστερον μὲν, ἀλλ' εὐέξοδον. ἢ διότι ἔλαττον πίνουσιν ἄκρατον διὰ τὸ μὴ δύνασθαι, καὶ μᾶλλον ἀπεμοῦσιν; ἔτι δὲ συμπέττει τὰ λοιπά. ταῦτό δ' ἐστὶ πρόβλημα.

35 Διὰ τί ὑπὸ τοῦ ἀκράτου ἀποθνήσκουσιν, εἴαν τις 23 προῖσχνάνας πολὺ πῖη; καὶ μὴ προῖσχνάναντες δὲ πολλοὶ τῶν φιλοπότων ἀθρόον πολὺ πιόντες ξηροὶ γίνονται. δοκεῖ γὰρ ὅ τε οἶνος τῶν θερμῶν εἶναι 874 b τὴν φύσιν καὶ τὸ ζῆν, τὸ δὲ ἀποθνήσκειν κατά- ψυξις. ἢ ὥσπερ καὶ ἀπὸ τοῦ κωνείου, σβεννυ- μένου κατὰ μικρὸν τοῦ θερμοῦ τοῦ οἰκείου, ἀλλὰ τρόπον ἕτερον· τὸ μὲν γὰρ τῇ ψυχρότητι πήγνυσιν τὸ ὑγρὸν καὶ θερμόν, ὁ δ' οἶνος τῇ θερμότητι τῇ 5 αὐτοῦ μαραίνει τὴν φυσικὴν θερμότητα. ὥσπερ οὖν ὑπὸ τοῦ πολλοῦ πυρὸς καὶ ἡλίου τὸ ὀλίγον πῦρ ἀποσβέννυται, οὕτω καὶ ἢ ἐν τοῖς σώμασιν θερ- μότης ὑπὸ τῆς ἐν τῷ οἴνω, εἴαν ὑπερβάλῃ.

Διὰ τί οἱ μεθύοντες ἀριδάκρυοι μᾶλλον; ἢ ὅτι 24 θερμοὶ καὶ ὑγροὶ γίνονται; ἀκρατεῖς οὖν εἰσίν, ὥστε ὑπὸ μικρῶν κινεῖσθαι.

10 Διὰ τί ἥττον μεθύσκονται ταῖς μεγάλαις κωθωνι- 25

large quantity at once, but it passes to its own place without being affected? For the bladder is the region of unconcocted moisture. But the stomach holds a little moisture and concocts it, so that it remains and makes the stomach moist.

Why do those who drink well-mixed wine suffer 22 more from headache than those who drink it unmixed? Is it because the mixed wine owing to its lightness penetrates into more places (just as it does in garments), and is more difficult to get rid of? Water is lighter in its parts, but it is easy to get rid of. Or is it because men drink less unmixed wine, because they are unable to drink so much, and are more liable to be sick? Unmixed wine also concocts the rest. This is the same problem.

Why do men die by drinking unmixed wine, if they 23 are lean beforehand and drink it in large quantities? Even if they are not lean beforehand, many who are given to drinking become dry by drinking large quantities at once; for both wine and life seem to belong by nature to the hot, whereas dying is a process of chilling. Or is the result the same as from hemlock, the natural heat of the body being gradually quenched, but in another way? For hemlock congeals what is wet and hot by coldness, but wine by its own heat withers the natural heat. Just as a little fire is extinguished by great heat and by the sun, so also the heat in the body is extinguished by the heat in the wine, if it surpasses it.

Why are the drunk very tearful? Is it because 24 they are both hot and moist? Consequently they are uncontrolled, and are moved by small impulses.

Why do men grow less drunk if they drink in large 25

874 b

ζόμενοι; πάντων γὰρ ταῦτὸ αἴτιον ἢ κατάκρουσις, τουτέστιν ἐπιπολῆς. τὸ μὲν γὰρ μεθύειν ἐν τοῖς περὶ κεφαλὴν τόποις.

Διὰ τί τοῖς μεθύουσιν οὐκ ἐγγίνεται ὕπνος; ἢ 25 ὅτι δεῖ πρὸς τοὺς ὕπνους ὑγρότητα ἐνυπάρχειν θερμὴν; αὕτη γὰρ εὐπεπτος. ἂν δὲ μὴ ἐνῆ ὑγρότης ὀλίγη ἢ δύσπεπτος, οὐ γίνεται ὕπνος. διὸ ἐν τοῖς κόποις καὶ μετὰ τὰ σιτία καὶ τοὺς πότους ὑπνωτικώτατοι γίνονται ὑπὸ τῆς θερμῆς. τοῖς δὲ μελαγχολικοῖς καὶ τοῖς μεγάλας πυρίας¹ ἀγρυπνία, τοῖς μὲν ὅτι κατέψυκται τὸ ὑγρόν, τοῖς δὲ ὅτι 20 οὐκ ἔστιν ἢ ὀλίγον. φανερόν οὖν ὅτι εἰς ταῦτα βλεπτέον καθ' ἕτερον τῶν παθῶν.

Διὰ τί οἱ οἰνόφλυγες τρέμουσιν, καὶ μᾶλλον ὅσω 26 ἂν ἀκρατοποτῶσιν; ἔστιν δὲ ὁ μὲν οἶνος θερμαντικός, ὁ δὲ τρόμος γίνεται μάλιστα ὑπὸ ψυχροῦ, διὸ οἱ ριγῶντες μάλιστα τρέμουσιν. πολλοῖς δ' 25 ἤδη χρωμένοις μόνῳ ἀκράτῳ τροφῆς χάριν τρόμοι τε ἰσχυροὶ συνέβησαν, ὥστε ἀπορρίπτειν τοὺς θλίβοντας, καὶ τῷ θερμῷ ὕδατι λουόμενοι ἀναισθήτως εἶχον. ἕτεροι δὲ τοῦτον τὸν τρόπον διαιτώμενοι, καὶ τρίψεσι χρώμενοι καὶ τροφῇ κρέασι, 30 πρὸς ἀποπληκτικὰς ἀρρωστίας ἤλασαν· οἷς τρόμοι μὲν διὰ τὴν ἀκίνησίαν ἦττον ἐνέπιπτον, πόνος δὲ ἰσχυρὸς καὶ τὸ μὴ δύνασθαι ἡσυχάζειν ἤδη. τοῦ μὲν τρόμου αἰτία ἢ ψυχρότης· φαίνονται γάρ,

¹ At least one word must be missing here. The translation implies such a word as ἔχουσι.

^a The word "all" suggests that there is an omission at the beginning of the problem. As the paragraph is merely a

draughts? The reason for all ^a these things is the same, namely, the repression of heat that is on the surface. For drunkenness originates in the parts about the head.

(Why does not sleep come to the drunk?) ^b Is it ^{25 a} because warm moisture is necessary to induce sleep? For it is easily concocted. If there is not a little moisture present or if it is unconcocted, no sleep comes. Hence in a state of weariness, and after food and drink, men are most inclined to sleep owing to the warmth. Sleeplessness is commonest among the melancholic and those who have hot vapour baths; in the former case because the moisture is chilled, and in the latter because it is either not present or is present only in small quantity. So it is evident that in either case we must look to these things (for the explanation).

Why do drunkards tremble, and especially if they ²⁶ drink unmixed wine? For wine is a heating agent, but trembling is mostly due to cold, which is the reason why the chilled tremble. But many whose entire diet consists of unmixed wine have before now trembled so violently as to throw off those who are holding them, and if they are bathed in hot water they are unconscious of it. Others, again, who live on this diet and also take massage and have meat for food are seized with apoplectic fits; in their case trembling attacks them less owing to their immobility, but they suffer from severe pain and an inability to remain at rest. Now the cause of trembling is cold; for

repetition of Problem 12, the words at the beginning of that problem should probably have a place here.

^b This is evidently a new problem, but the mss. and most editions do not state it. The words inserted here are from the Latin of Th. G. but they do not seem entirely appropriate.

874 b ὡσπερ εἴρηται, οἳ τε ῥιγῶντες τοῦτο πάσχοντες
καὶ οἳ σφόδρα γέροντες. ἀμφοτέρων δὲ τούτων
85 τῶν μὲν τὸ πάθος ψυχρόν, τῶν δὲ ἢ ἡλικία· ὁ δὲ
οἶνος θερμαντικώτατος, ὥσθ' ὑπεναντίον ἂν τι
συμβαίνοι. ἢ οὐθὲν κωλύει γίνεσθαι ταῦτ' ὑπὸ
ἐναντίων, μὴ ὡσαύτως δὲ ποιούντων, οἶον καὶ ὑπὸ
τῶν πάγων ἀποκάεται καὶ ὑπὸ θερμοῦ, ὅταν ὁ
875 a πάγος ἀθρόον ποιήσῃ τὸ θερμόν· ὥστ' ἔστι μὲν
ὡς ὑπ' ἐναντίων τὸ πάθος τὸ αὐτὸ συμβαίνειν·
ἔστι δὲ ὡς ὑπὸ τοῦ αὐτοῦ τὸ αὐτό. ὁ δὲ τρόμος
γίνεται μὲν ὑπ' ἐνδείας θερμοῦ, οὐ παντός, ἀλλὰ
τοῦ οἰκείου. φθείρεται δὲ τὸ θερμόν ἢ μαράνσει
5 ἢ σβέσει, σβέσει μὲν ὑπὸ τῶν ἐναντίων, ὑπὸ ψυχροῦ
καὶ ὑγροῦ, μαράνσει δὲ ἐνδεία τροφῆς, οἶον οἱ
λύχνοι, ὅταν μὴ ἔχωσιν ὑπέκκαυμα μηδ' ἔλαιον·
ἢ ὑπὸ θερμοῦ ἀλλοτρίου, οἶον τὸ πῦρ ἐν τῷ ἡλίῳ
καὶ οἱ λύχνοι παρὰ τὸ πῦρ. οἳ μὲν οὖν ῥιγῶντες
ὑπὸ ψυχροῦ σβεννυμένου τοῦ θερμοῦ τρέμουσιν.
10 διὸ καὶ τοῖς προσχεομένοις τὸ θερμόν αἱ φρίκαι
γίνονται· ἐγκατακλειόμενον γὰρ τὸ ψυχρὸν εἴσω
καὶ ἀντιπεριστάμενον ἴστησι τὰς τρίχας· καὶ τῷ
ἀρχομένῳ πυρέττειν τὸ γινόμενον ῥίγος δι' ὁμοίαν
αἰτίαν γίνεται. ἐν δὲ τῷ γῆρα τὸ θερμόν μαραί-
νεται τῆς τροφῆς ὑπολειπούσης. τροφή μὲν γὰρ
15 ὑγρὸν τῷ θερμῷ, τὸ δὲ γῆρας ψυχρόν. οἳ δὲ
οἰνόφλυγες μαραινομένης μὲν τῆς οἰκείας θερμό-
τητος τρέμουσι, καὶ εἴ τινας ἄλλοι τοῦτο πάσχουσι
διὰ τὸν οἶνον, οὐ τὸν αὐτὸν δὲ τρόπον τοῖς διὰ
γῆρας, ἀλλ' ἔτι τρίτος ἦν τρόπος τῆς τοῦ θερμοῦ
φθορᾶς. ὅταν γὰρ ὑπερβάλλοντι χρῶνται ἐν τῷ
20 σώματι, πολλὴ οὔσα ἢ θερμότης ἢ ἀποσβέννυσιν
ἢ ἀσθενῆ ποιεῖ τὴν οἰκείαν θερμότητα ἢ ἰσχύομεν·

as we have said it is evident that the chilled suffer from it and the very old. In these cases cold is the trouble in the former case, and age in the latter ; but wine being a heating agent, the result should be opposite. Or is there nothing to prevent the same result being produced by opposite causes, not acting in the same way ? For instance, burning is produced both by frost and by heat, when the frost causes the heat to collect ; in this way it happens that the same effect is produced by opposite causes ; and the same effect can also be produced by the same cause. Trembling, then, arises from lack of heat, not any kind of heat, but of natural heat. Heat is extinguished by fading or by quenching, quenching by its opposites, that is by cold and wet, fading by lack of sustenance ; this can be seen in lamps, when they have neither fuel nor oil ; but heat is also extinguished by external heat, as we see with the fire in the sun and with lamps in firelight. Now the chilled tremble owing to the cold, when the heat is quenched. So shivering happens to men when hot water is poured over them. For the cold which is enclosed within and repressed makes the hair rise ; the shivering which takes place at the beginning of a fever is due to a similar cause. In old age heat fades because its sustenance falls short. For moisture is the sustenance of heat, and old age is cold. Drunkards tremble because their natural heat fades, and if others suffer the same effect through wine, it is not in the same way as those whose trembling is due to old age, but there is a third way in which the destruction of heat takes place. For when men have an excess (of wine) in the body, its heat, which is considerable, either extinguishes or weakens the natural heat, wherein our strength lies ; when the motive force cannot

875 a

ἔστι γὰρ ὅταν μὴ κρατῆ τὸ κινουῦν τοῦ κινουμένου, οἷον ὅταν ξύλον μακρὸν καὶ μέγα μὴ ἐγκρατῶς¹ ἔχη τις, τὸ ἄκρον τρέμει. γίνεται δὲ τοῦτο ἢ τῷ τὸ ἐχόμενον μείζον εἶναι ἢ τῷ τὸ κινουῦν ἔλαττον. 25 συμβαίνει δὲ σβεννυμένου τοῦ θερμοῦ (δοκεῖ γὰρ αἴτιον τοῦτο εἶναι τοῦ κινεῖσθαι τοῖς ζώοις) μὴ κρατεῖν τὴν φύσιν. σημεῖον δ' ὅτι διὰ ψυχρότητα γίνεται τὸ πάθος τοῖς οἰνόφλυξιν καὶ τοῖς πρεσβύταις, ὅτι ἄνευ ρίγους γίνεται ὁ τρόμος.

Διὰ τί ὁ ἀκροθώραξ μᾶλλον παροινεῖ τοῦ μᾶλλον 27 30 μεθύοντος καὶ τοῦ νήφοντος; ἢ ὅτι ὁ μὲν νήφων εὖ κρίνει, ὁ δὲ παντάπασιν μεθύων διὰ τὸ τὰς αἰσθήσεις ἐπιπεπλασμένας εἶναι, οὐ δυνάμενος τὸ βάρος φέρειν, οὐ κρίνει· οὐ κρίνων δὲ οὐ παροινεῖ; ὁ δὲ ἀκροθώραξ κρίνει τε καὶ διὰ τὸν οἶνον κακῶς κρίνει, ὥστε παροινεῖ· ὥσπερ καὶ Σάτυρον τὸν 35 Κλαζομένιον ὄντα φιλολοίδορον, φεύγοντα δίκην, ἵνα ὑπὲρ τοῦ πράγματος λέγη καὶ μὴ λοιδορῆται, τὰ ὦτα ἐπέπλασαν, ἵνα μὴ ἀκούων εἰς λοιδορίαν τρέπηται· παυομένου δὲ τοῦ ἀντιδίκου ἀφείλον· μικρὰ δὲ ἀκούσας ἔτι λέγοντος οὐκ ἀπέσχετο, ἀλλὰ 40 κακῶς ἔλεγεν, διὰ τὸ αἰσθάνεσθαι μὲν, κακῶς δὲ κρίνειν.

875 b Διὰ τί πρὸς τὸν γλυκὺν οἶνον ἠδίω ὄντα οὐ 28 γίνονται οἰνόφλυγες; ἢ ὅτι οὐκ ἴδιον χυμὸν ἔχει ὁ γλυκὺς, ἀλλ' ἀλλότριον; φιλόγλυκός οὖν μᾶλλον ἢ φίλοιος ἔσται ὁ κεκρατημένος.

¹ ἐγκρατῶς Richards: εὐκρατῶς Ruelle.

control the object moved, as when one has not complete control over a long large plank, the extreme end quivers. This is due to the fact that either what is held is too large, or that which moves it is too weak. So when the heat is extinguished (for heat seems to be the cause of movement among living creatures), it is no longer possible to control its nature. That this condition is produced in drunkards and the aged by a process of cooling is proved by the fact that the trembling is not accompanied by chill.

Why is the slightly drunk man more troublesome 27 than the man who is more drunk, as well as more troublesome than the sober man? Is it because the sober man is capable of sound judgement, while the drunken man, because his senses are blocked and he cannot support the feeling of heaviness, does not judge at all and, as he forms no judgement at all, he is not troublesome? The slightly drunk, on the other hand, does form judgements, but owing to the wine he is wrong, so that he is troublesome. This reminds one of Satyrus of Clazomenae, who was given to saying offensive things; when he was defending a case, in order that he might discuss the case and not become offensive, he blocked up his ears to avoid hearing and consequently falling into offensive speech; but just as his opponent was finishing his speech, he uncovered his ears; and after hearing him say a few words, he could not refrain, but abused him, because his perception was acute, but his judgement was unsound.

Why do not men become drunkards by addiction 28 to sweet wine, which is more pleasant? Is it because sweet wine has a flavour which does not belong to the wine, but to something else? The man who is addicted to it is therefore rather fond of the sweet than fond of wine.

875^b
 5 Διὰ τί οἱ οἰνόφλυγες ὑπὸ τοῦ ἡλίου θερμαινόμενοι 29
 μάλιστα χαίρουσιν; ἢ ὅτι δέονται πέψεως; ἔτι
 δὲ καὶ διὰ τὸ κατεψῦχθαι· διὸ καὶ αἱ ἀποπληξίαι
 καὶ αἱ ἀποναρκώσεις τάχιστα μετὰ τοὺς πότους
 γίνονται.

Διὰ τί τοῖς μεθύουσιν ἐνίοτε πολλὰ φαίνεται τὸ 30
 10 ἐν ὄρωσιν; ἢ ὅτι αἱ ἀρχαὶ τῶν ὄψεων ἔσω μὲν
 κινουῦνται ὑπὸ τοῦ οἴνου, καθάπερ ἡ ὄλη κεφαλή,
 κινουμένων δὲ τῶν ἀρχῶν οὐκ εἰς ταῦτὸ συμ-
 βάλλουσιν αἱ ὄψεις, ἀλλ' οἶον ἐπὶ μέρος ἑκάτερον
 τοῦ ὀρωμένου· διὸ δύο φαίνεται; ταῦτὸ δὲ τοῦτο
 γίνεται καὶ ἐάν τις κάτωθεν πιέσῃ τὴν ὄψιν·
 15 ἐκίνησεν γὰρ τὴν ἀρχὴν τῆς ὄψεως, ὥστε μηκέτι
 εἰς ταῦτὸ συμβάλλειν τῇ ἑτέρᾳ. ἢ μὲν οὖν τοιαύτη
 κίνησις ἔξωθεν γίνεται, ἢ δὲ ἀπὸ τοῦ οἴνου ἔσωθεν.
 διαφέρει δ' οὐθέν· ταῦτὰ γὰρ ποιήσῃ ὅπως οὖν
 κινηθεῖσα.

Διὰ τί τῶν μεθυόντων ἡ γλῶττα πταίει; πότερον 31
 20 ὅτι καθάπερ τὸ ὄλον σῶμα ἐν τῇ μέθῃ σφάλλεται,
 οὕτω καὶ ἡ γλῶττα σφαλλομένη πταίει καὶ οὐ
 δύναται τὴν λέξιν διαρθροῦν; ἢ σπογγώδης ἐστὶν
 ἢ τῆς γλώττης σὰρξ· βρεχομένη οὖν ἐξαίρεται·
 τούτου δὲ συμβαίνοντος διὰ τὸ πάχος τὸ ἀπὸ τοῦ
 ὄγκου δυσκινητοτέρα οὔσα οὐ δύναται διακριβοῦν.
 25 ἢ διότι οὔτε ἐν τῷ ὑγρῷ δυνάμεθα λαλεῖν διὰ τὴν
 ἀπουσίαν τοῦ ἀέρος, οὔθ' ὅταν εἰς τὸ στόμα λά-
 βωμεν ὑγρόν; ἐν τῇ μέθῃ οὖν ἐν ὑγρῷ πολλῷ τῆς
 γλώττης οὔσης οὐκ ἀκριβοῦμεν· τὸ δὲ μὴ ἀκριβοῦν
 ἐστὶ τὸ πταίειν. ἢ διότι ἐν ταῖς μέθαις ἡ ψυχὴ
 συμπαθῆς γινομένη πταίει; τῆς ψυχῆς οὖν τοῦτο
 30 πασχούσης εἰκὸς καὶ τὴν γλῶτταν ταῦτὸ πάσχειν·
 ἀπ' ἐκείνης γὰρ ἡ τοῦ λέγειν ἀρχή. διὸ καὶ χωρὶς

Why do drunkards take special pleasure in being warmed by the sun? Is it because they need concoction? It is also due to the fact that they are chilled; this is why apoplexy and torpor often follow drinking.

Why does a single object sometimes appear plural to those who are drunk? Is it because the sources of sight within are disturbed by the wine, as also is the whole head, and when the sources are disturbed the vision does not focus on the same whole, but as it were upon each part of the object seen in turn; hence it appears double? The same effect is produced if one presses the eye from below; for this has disturbed the origin of sight, so that one eye no longer focuses at the same point as the other eye. This kind of disturbance is from the outside, but that due to wine is from within. But this makes no difference; the result will be the same however the eye is disturbed.

Why does the tongue of the drunk stumble? Is it because in drunkenness just as the whole body stumbles, so also the tongue stumbles and staggers and cannot articulate? Is it because the flesh of the tongue is spongy, consequently when wet it swells? When this occurs, being hard to move, owing to the thickening due to the swelling, it cannot pronounce words accurately. Or is it because just as under water we cannot speak owing to the absence of air, so we cannot do so when we have taken liquid into the mouth? In drunkenness we cannot pronounce distinctly because the tongue is surrounded by a quantity of liquid; and to be unable to pronounce distinctly is to stumble. Or is it because in drunkenness the mind stumbles in sympathy with the body? As the mind is in this condition the tongue naturally shows the same effect; for speech originates from the mind.

875^b τῆς μέθης, ὅταν ἡ ψυχὴ πάθῃ τι, συμπάσχει καὶ ἡ γλῶττα, οἷον τῶν φοβουμένων.

Διὰ τί οἱ οἰνόφλυγες καὶ οἱ περὶ τὴν θάλατταν 32
85 χαίρουσιν ἡλίω; ἢ διότι οἱ μὲν οἰνόφλυγες δέονται πέψεως, καὶ ἅμα συμβαίνει τινὰς τόπους κατεψύχθαι; διὸ καὶ ἀποπληξίαι καὶ ἀποναρκώσεις μετὰ τοὺς πότους. οἱ δὲ θαλάττιοι διὰ τὸ ἀεὶ ἐν ὑγρῷ εἶναι τοῦτο ποιοῦσιν.

Διὰ τί οἱ μεθύοντες ἀδύνατοι ἀφροδισιάζουσιν; ἢ 33
40 ὅτι δεῖ μᾶλλον τινα τόπον ἐκθερμανθῆναι τοῦ ἄλλου σώματος, οἱ δὲ διὰ τὸ πλῆθος τῆς θερμασίας ἀδυνατοῦσιν· ἀποσβέννυται οὖν τὸ ἀπὸ τῆς κινήσεως, θερμὸν γινόμενον ὑπὸ τοῦ περιέχοντος. ἢ 878^a διότι δεῖ μὲν ἐκθερμανθῆναι τοὺς κάτω τόπους, ὁ δ' οἶνος ἄνω πέφυκεν φέρεσθαι, ὥστε ἐκεῖ ποιεῖ τὴν 5 θερμασίαν, ἐντεῦθεν δὲ ἀπάγει. καὶ μετὰ τὰ σιτία ἡκιστα ἀφροδισιαστικοί, καὶ κελεύουσιν ἀριστᾶν μὲν πολὺ, δειπνεῖν δὲ ὀλίγον· ἀπέπτων μὲν γὰρ ὄντων ἄνω φέρεται, πεπεμμένων δὲ κάτω τὸ θερμὸν καὶ τὸ ὑγρὸν· ἢ δὲ τοῦ σπέρματος γένεσις ἐκ τούτων. καὶ οἱ κοπιῶντες ἐξονειρώττουσιν, ὅτι ὑγρὸς 10 καὶ θερμὸς ὁ κόπος· εἴαν οὖν ἐν τῷ τόπῳ τούτῳ γένηται ἢ περίπτωσις, συμβαίνει ἐξονειρώττειν. διὰ ταῦτό δὲ καὶ ἐπὶ τοῖς ἀρρωστήμασιν, ὅσοις γίνεται, συμβαίνει. καὶ τοῖς φοβουμένοις καὶ τοῖς ἀποθνήσκουσιν συμβαίνει ὡσαύτως.

15 Διὰ τί νέοι ὄντες ἐνουροῦσι μᾶλλον, ὅταν μεθυ- 34
σθῶσιν, ἢ πρεσβύτεροι; ἢ διὰ τὸ θερμοῦς καὶ ὑγροῦς εἶναι πολὺ τὸ συρρυέν γίνεται περίπτωμα, διὰ τὸ μὴ ἀναλίσκειν τὸ σῶμα τὸ ὑγρὸν, ὥστε ὑπερχεῖται; πρεσβυτέροις δὲ γινομένοις διὰ ξηρό-

Consequently apart from drunkenness, when the mind is affected in any way, the tongue suffers sympathetically, as for example in men who are afraid.

Why is it that drunkards and those who live by 32 the sea rejoice in the sun? Is it because drunkards crave for concoction, and certain parts of them are chilled? This is why apoplexy and torpor follow drinking. Sea folk have the same desire, because they are continually in the wet.

Why cannot the drunken have sexual intercourse? 33 Is it because one part of the body must be hotter than the rest, which cannot be the case with the drunken owing to their excessive heat? So the heat caused by movement is quenched, being heated by the surrounding heat. Or is it because the lower parts require to be heated, but wine naturally travels upwards, so that it produces heat there and withdraws it from the other part? After food men are least inclined to intercourse, so that they recommend a large breakfast but a light dinner; for when food is undigested there is an upward impetus of heat and moisture, but when it is digested, the impetus is downwards: and the production of semen is due to heat and moisture. The weary emit semen during sleep because weariness is a warm and wet condition; if, then, there is any waste product in this place, emission occurs. It is for the same reason that it happens with those whose health is bad. Similarly also it occurs with those who are frightened or dying.

Why do the young wet their beds more readily than 34 the old when they are drunk? Does the waste product flow more readily because they are warm and moist, because the body does not expend the moisture, so that it overflows? But when they are

876 a
 20 τητα τὴν ὑπερβολὴν ἀντισπᾶ τὸ σῶμα. ἢ ὅτι
 μᾶλλον ὑπνωτικώτεροί εἰσιν οἱ νέοι τῶν πρε-
 σβυτέρων; διὸ τοὺς μὲν νέους καθύπνους ὄντας
 λαιθάνει ἢ ὄρμη τοῦ οὔρου ἐκπίπτουσα πρὶν δι-
 εγερθῆναι, τοὺς δὲ πρεσβυτέρους οὐ, καθάπερ
 οὐδὲ τῶν ἔξωθεν κινήσεων οὐδὲν ἡττόν τι λαιθάνει
 αὐτοὺς ἢ τοὺς νέους. δῆλον δέ· καὶ γὰρ αὐτοὶ οἱ
 25 νέοι ἐν τοῖς βαθυτάτοις ὕπνοις μάλιστα ἐνουροῦσιν.

Διὰ τί τὸ ἔλαιον πρὸς τὰς μέθας συμφέρει, καὶ 35
 τοῦ δύνασθαι πίνειν τὸ καταρροφεῖν; ἢ διότι
 οὐρητικόν ἐστι καὶ τῷ πόματι προοδοποιεῖ;

PROBLEMS, III. 34–35

older owing to their dryness the body absorbs the excess. Or is it because the young are more prone to sleep than their elders? So when the young are asleep, the flow of urine escapes without their knowing it, before they can wake up, but with older men this is not so, just as no outside movement escapes them as much as the young. This is clear; for the young themselves pass water most in the deepest sleep.

Why is oil beneficial in drunkenness, and why does sipping it give one more power to drink? Is it because it causes water to pass and so prepares the way for the drink?

Δ

ΟΥΣΑ ΠΕΡΙ ΑΦΡΟΔΙΣΙΑ

Διὰ τί ὁ ἀφροδισιάζων καὶ ὁ ἀποθνήσκων ἀνα-
βάλλει τὰ ὄμματα, καθεύδων δὲ καταβάλλει; ἢ
διότι ἀνωθεν τὸ θερμὸν ἐξιὸν ἀναστρέφει ἵνα περ
ὄρμᾶ; ἐν δὲ τῷ ὕπνῳ κάτω συνάγεται, διὸ ῥέπει
κάτω· συγκλείονται δὲ οἱ ὀφθαλμοὶ παρὰ τὸ μὴ
ὑπάρχειν ἔτι νοτίδα.

Διὰ τί τῶν πλείοσιν ἀφροδισίοις χρωμένων ἐπι-
δηλότατα συνδίδωσι τὰ ὄμματα καὶ τὰ ἰσχία, τὰ
μὲν ἐγγὺς ὄντα, τὰ δὲ πόρρω; πότερον ὅτι καὶ
ἐν αὐτῇ τῇ συνουσίᾳ ἐπιδηλότατα συμπονεῖ ταῦτα
στει β τῇ ἐργασίᾳ συνιόντα περὶ τὴν πρόεσιν τοῦ σπέρ-
ματος; συνεκθλίβεται οὖν μάλιστα ἐντεῦθεν ὅσον
εὐτηκτον τῆς τροφῆς ἔνεστι διὰ τὴν θλίψιν. ἢ
διότι παραθερμαινόμενα τήκεται μάλιστα· ὁ δὲ
ἀφροδισιασμός θερμότητι ἐργάζεται. μάλιστα δὲ
ε ταῦτα θερμαίνεται, ἃ κινεῖται ἐν τῇ ἐργασίᾳ. οἱ
δὲ ὀφθαλμοὶ καὶ τὰ περὶ τὴν ἔδραν ἐπιδήλως συμ-
πονεῖ. οὔτε γὰρ μὴ συναγαγόντι τὰ περὶ τὴν
ἔδραν ἐνδέχεται προέσθαι, οὔτε τῶν ὀφθαλμῶν κατα-
βληθέντων· τὰ μὲν γὰρ περὶ τὴν ἔδραν συνιόντα
θλίβει, οἷον ἐκ κύστεως τῇ χειρὶ τὸ ὑγρόν, ἢ δὲ
10 τῶν ὀφθαλμῶν συναγωγὴ τὰ ἀπὸ τοῦ ἐγκεφάλου.

BOOK IV

PROBLEMS CONCERNING SEXUAL INTERCOURSE

Why does a man when indulging in sexual intercourse 1 and when dying cast his eyes upwards, but when asleep downwards? Is it because when the heat is emerging upwards the eyes turn in the direction in which the heat travels? In sleep the heat collects below, and so it inclines downwards; and the eyes close because there is no moisture there.

Why do both the eyes and the buttocks sink very 2 noticeably in those who indulge excessively in sexual intercourse, though the latter are near to and the former far from the sex organs? Is it because both these parts obviously co-operate in the act of coition by contracting at the time of the emission of semen? Consequently all the nourishment, which in these parts is easily dissolved, is forced out by the pressure. Or is it because things which become overheated waste away most, and the sexual act operates through heat? And the parts which are moved in the act are most heated. Now the eyes and the parts about the fundament obviously join in the labour. For it is impossible to emit semen without contracting the parts about the fundament, or while closing the eyes. The contraction of the buttocks forces out the moisture (just as the hand does from the bladder), while the contraction of the eyes forces out the moisture about

876^b ὅτι δὲ μεγάλην ἔχουσιν τὰ ὄμματα τὴν δύναμιν καὶ
 ὁ τόπος αὐτῶν πρὸς γένεσιν, δηλοῖ ἢ τῶν ἀτέκνων
 καὶ ἀγόνων¹ γυναικῶν τοῖς ἐναλείμμασι πείρα, ὡς
 δέον ταύτῃ διελθεῖν εἰς τὸ σπέρμα δύναμιν. πίονα
 15 δὲ ἄμφω τυγχάνει ὄντα πάντων αἰεὶ, ἀρχός τε καὶ
 ὄμματα· διὰ μὲν οὖν τὴν συνεργίαν κοινωνεῖ τῆς
 θερμασίας, διὰ δὲ ταύτην λεπτύνεται καὶ συν-
 αποκρίνεται πολὺ εἰς τὸ σπέρμα. οὔτε γάρ, ἂν μὴ
 πῖον ᾖ, ὁμοίως γρύσει ἢ θερμότης, οὔτε πῖον ὄν μὴ
 συμπονοῦν, οἷον ἐν τῇ κοιλίᾳ· ἀλλὰ οἱ νεφροὶ τῶν
 20 ἄλλων μάλιστα αἰσθάνονται διὰ τὴν γειτνίασιν.
 καὶ αὕτη δὲ ἢ τοῦ σπέρματος πάροδος παρὰ τοὺς
 τόπους τούτους οὔσα ἐπιδηλότατα ἱκανὴ ἐστὶ
 λεπτύνειν· ἀφαιρεῖ γάρ, ἀλλ' οὐ προστίθησι
 πλησιάζουσα.

Διὰ τί καὶ οἱ ἀφροδισιάζοντες καὶ οἱ εὐνοῦχοι³
 25 οὐ χρώμενοι ἀφροδισίοις ὁμοίως² ἀμφότεροι τὰ ὄμ-
 ματα πρὸς ὀξυωπίαν βλάπτονται; ἢ ὅτι τοῖς μὲν
 διὰ λαγνείαν, τοῖς δὲ διὰ τὴν πήρωσιν τὰ ἄνω ξηρὰ
 γίνεται μᾶλλον τοῦ δέοντος, ἐπιδηλότατα δ' ἐν
 τούτοις, ὅσων τὸ ἔργον ἐστὶν ἀκριβές· ἢ δ' ὄψις
 τοιοῦτον; κατασπυμένων δὲ τῶν ὑγρῶν τὰ ἄνω
 30 ξηραίνεται. ὁ μὲν οὖν ἀφροδισιασμὸς δῆλον ὅτι
 τοῦτο ποιεῖ· τοῖς δὲ εὐνούχοις τὰ τε σκέλη οἶδει
 καὶ αἱ κοιλίαι εὐλυτοὶ ὡς κάτω μεθισταμένου τοῦ
 ὑγροῦ.

Διὰ τί ἄνθρωπος μόνον, ὅταν ἀρχηται δύνασθαι⁴
 ἀφροδισιάζειν, ἡβᾶ, τῶν δὲ ἄλλων ζώων ὅσα
 35 τρίχας ἔχει οὐθέν; ἢ ἐπειδὴ κατὰ τὰς ἡλικίας
 μεταβάλλει τὰ ζῶα εἰς τοῦναντίον; φωνὴ τε γάρ

¹ ἀγόνων Forster : γονίμων Ruelle.

² ὁμοίως some mss. : ὁμῶς Ruelle.

PROBLEMS IV. 2-4

the brain. It is obvious that the eyes and the region round them have considerable influence on procreation from the fact that childless and barren women try the experiment of anointing the eyes on the assumption that power must pass into the semen by this way. Again, in all men these parts, the fundament and the eyes, are fat ; so owing to the part they play they share in the heat, and for this reason grow thin and pass a quantity of matter into the semen. For unless they are fat the heat will not liquefy them to the same extent, nor will it do so if the part is fat but does not co-operate, as is the case with the belly. But the kidneys owing to their proximity share more in the sensation than the other parts. The effect of the mere passage of the semen through these parts is obviously to make them thin ; for it removes something from them, but, though so near, it adds nothing.

Why do both those who indulge in sexual excess 3 and eunuchs who never do so, alike deteriorate in sharpness of vision ? Is it because in both cases (the former because of their lustfulness and the latter because of their mutilation) the upper parts become drier than they ought to be, and this is most evident with those parts which have to do accurate work ; and vision does work of this kind ? When the moisture is drawn downwards, the upper parts become dry. Now it is obvious that sexual intercourse has this effect ; with eunuchs the legs swell and the bowels are easily relaxed, as the moisture shifts downwards.

Why is it that man alone grows hair when he 4 begins to be capable of sexual intercourse, whereas all other animals which have hair do not ? Is it because on coming to maturity animals change in nature to their opposites ? For the voice becomes deep instead

876^b βαρεία ἐξ ὀξείας γίνεται, καὶ δασύνεται ἐκ ψιλῶν·
 δῆλον οὖν ὡς καὶ τὰ ἐκ γενετῆς δασέα ζῶα ψιλοῖτ'
 ἄν, οἳ δασύνοιο, σπερματικὰ γινόμενα. οὐ πάσχει
 δὲ τοῦτο διὰ τὸ τὰ σπερμαίνοντα ξηρότερα γίνεσθαι
 καὶ ἀραιότερα, ἐξ ὧν θριξὶ φύεται. δῆλον δὲ ἐκ τοῦ
 877^a μὴ ἐν ταῖς οὐλαῖς φύεσθαι τρίχας· στεγαναὶ γὰρ
 αἱ οὐλαί, ἀλλ' οὐκ ἀραιαί. μηδὲ τοῖς παιδίοις καὶ
 γυναιξίν· ὑγρὰ γὰρ καὶ ἄμφω, ἀλλ' οὐ ξηρά.
 5 Διὰ τί ἡ ἀνυποδησία οὐ συμφέρει πρὸς ἀφρο- 5
 δισιασμούς; ἢ ὅτι τὸ μέλλον ἀφροδισιάζειν σῶμα
 δεῖ τὰ ἐντὸς θερμὸν εἶναι καὶ ὑγρὸν; τοιοῦτον δὲ
 ἐν τοῖς ὕπνοις μᾶλλον ἢ ἐν τῷ ἐγρηγορέναι· διὸ καὶ
 ταχὺ καὶ ἄνευ ἐργασίας οἱ ἐξονειρωγμοὶ γίνονται,
 10 ἐγρηγοροῦσι δὲ μετὰ πόνου. ἅμα δὲ τὸ σῶμα
 τοιοῦτον καὶ οἱ πόδες ὑγρότεροι καὶ θερμότεροι·
 σημεῖον δέ, ὅτι καθευδόντων θερμοί, ὡς ἅμα τοῖς
 ἐντὸς οὕτως ἔχοντες. ἢ δ' ἀνυποδησία τοῦναντίον
 ποιεῖ· ξηραίνει γὰρ καὶ ψύχει. ὥστ', εἴτε ἀδύνατον
 μὴ θερμῶν ὄντων ἀφροδισιάσαι εἴτε χαλεπόν,
 15 ἀνάγκη ἀσύμφορον εἶναι πρὸς τὴν τῶν ἀφροδισίων
 χρῆσιν.

Διὰ τί ἐκλύεται μάλιστα τῶν ζώων ἀφροδισιάσας 6
 ἄνθρωπος; ἢ διότι πλεῖστον προῖεται σπέρμα κατὰ
 λόγον τοῦ σώματος; διὰ τί δὲ πλεῖστον προῖεται;
 ἢ ὅτι ἥκιστα ἐκπονεῖ τὴν τροφήν καὶ φύσει ὑγρὸν
 20 καὶ θερμὸν ἐστὶ τῶν ζώων μάλιστα; ὧν τὸ μὲν
 ποιεῖ σπέρμα πολὺ, τὸ δὲ τὴν φύσιν σπερματικὴν
 ποιεῖ· καὶ γὰρ τὸ σπέρμα τοιοῦτόν ἐστιν, ἕως ἄν
 σώζηται.

of shrill, and the body becomes hairy instead of smooth ; so obviously animals which are hairy from birth would become smooth and not hairy, when they become capable of reproduction. This is not so, because animals which emit semen become drier and rarer, conditions which favour the growth of hair. This is clear because hair does not grow on scars ; for scars are dense and not rare ; nor does it grow on boys and women ; for both are moist and not dry.

Why is it that bare feet are not good for sexual intercourse ? Is it because the body intending sexual intercourse should be warm and moist within ? This condition obtains more in sleep than when one is awake ; so emission of semen takes place quickly and without effort when asleep, but requires effort when awake. When the body is in that condition, the feet are moist and warmer ; this is proved by the fact that when men are asleep their feet are warm, being simultaneously in the same condition as the inward parts. Now bare feet produce the opposite result ; they cause both dryness and chill. So that, as it is impossible, or at least difficult, to have sexual intercourse unless the feet are warm, bare feet must be disadvantageous for sexual intercourse.

Why is a man more slack after sexual intercourse than other animals ? Is it because in proportion to the size of the body the emission of semen is greatest in his case ? But why is it greatest ? Is it because man uses less effort in digesting food and is naturally moister and warmer than other creatures ? Where there is moisture the semen is considerable and where there is heat there is a natural inclination to produce semen ; and the semen has these characteristics while it remains in the body.

877^a Διὰ τί τοῦ ἀφροδισιάζειν γινομένου διὰ θερμό- 7
 τητα, τοῦ δὲ φόβου ὄντος ψυκτικοῦ καὶ τοῦ ἀπο-
 25 θνήσκειν, ἐνίοις, ὅταν γένωνται ἐν τούτοις τοῖς
 πάθεσι, σπέρμα προέρχεται; ἢ ὅτι ψυχομένων
 ἐνίων τόπων ἕτεροι ὑποθερμαίνονται, τήν τε
 οἰκείαν ἔχοιτες θερμότητα καὶ δεχόμενοι τήν τῶν
 καταψυχομένων τόπων; ὥστε καταψυχομένων μὲν
 συμβαίνει, οὐ διὰ τὸ ψύχεσθαι μέντοι, ἀλλὰ καὶ
 30 διὰ τὸ θερμαίνεσθαι. δῆλον δὲ καὶ τῇ ὄψει· τῶν
 γὰρ φοβουμένων τὰ ἄνω λειψαιμεῖ, τὰ δὲ κάτω
 ἰγραινεται, καὶ κοιλία καὶ κύστις λύεται. ὑπιὸν
 οὖν τὸ θερμὸν ἐν μὲν τῷ φόβῳ κάτω, ἐν δὲ τῷ
 θανάτῳ κάτωθεν ἄνω, ἐξυγραῖνον τῇ θερμότητι
 ποιεῖ τὴν τοῦ σπέρματος ἕξοδον.

85 Διὰ τί οὐ δεῖ μὴ ὀργῶντα οὔτε ἀφροδισιάζειν 8
 οὔτε ἐμείν οὔτε πτάρνυσθαι οὔτε φῦσαν ἀφιέναι;
 ἢ ὅτι μὴ ὀργῶντες ὁμοίως ἔχομεν τοῖς ἐκ τῆς γῆς
 ἀνασπασμένοις, οἷς προσεκσπᾶται τι ἀλλότριον ἢ
 ἐγκαταλείπεται ἀποσπασθέν; ἅπαν δὲ ὃ δεῖ μὲν
 877^b ἐξαρθῆναι, κολοβὸν δὲ ὑπολείπεται, πλείω χρόνον
 παρέξει πόνον. εἰάν τέ τις κινήσῃ τι ἀλλότριον,
 τοῦτο πόνον παρέξει, οὐκ ἐν τῇ αὐτοῦ χώρα ὄν·
 ἂ συμβῆσεται τοῖς μὴ ὀργῶσιν ποιούσιν τι τῶν
 εἰρημένων.

Διὰ τί νήστεις θάπτον ἀφροδισιάζουσιν; ἢ διότι 9
 5 οἱ πόροι κενώτεροι οἱ τοῦ σώματος νήστεσιν,
 πλήρεσι δὲ πλήρεις· κωλύουσιν οὖν τὴν εἰς τὸ
 σπέρμα ὑγρότητα διεξιέναι. δῆλον δὲ ἐπὶ τῆς
 κύστεως· οὐ γὰρ δύνανται πλήρους οὔσης ταχὺ
 ἀφροδισιάζειν.

PROBLEMS, IV. 7-9

Why is it that, although sexual intercourse is due 7 to heat, and fear and death are both chilling, semen flows in some men when they are frightened or dying? Is it because when some parts of the body are chilled others grow hot, because they have their own natural heat and also receive that from the chilled parts? So that the emission of semen occurs when there is cooling, but it is not due to cooling but to heat. This is evident from observation; for when men are afraid the upper parts are drained of blood, but the lower parts are moist, and the bowels and the bladder are relaxed. So the heat under the influence of fear descends below, and in death rises from below to above, and causing moisture by its heat, produces an emission of semen.

Why should we neither have sexual intercourse, 8 nor be sick, nor sneeze, nor let out breath except when in a turgid state? Is it because when we are not in this state we are like plants torn from the earth to which some foreign matter is attached or from which some part is torn off and left behind? For that which ought to be removed but is curtailed and left behind, will cause trouble for a considerable time. If, again, one removes anything foreign, this will also cause trouble, by being absent from its proper place; and this occurs when men perform any of the acts we have mentioned when they are not in a turgid state.

Why is sexual intercourse more rapid with men 9 who are fasting? Is it because the passages of the body are more empty when men are fasting, but full when men are replete? So they prevent the moisture from passing into the semen. This is obvious in the bladder; for when this is full men cannot easily have sexual intercourse.

877 b

Διὰ τί οἱ νέοι, ὅταν πρῶτον ἀφροδισιάζειν
 10 ἄρχωνται, αἷς ἂν ὀμιλήσωσι, μετὰ τὴν πρᾶξιν
 μισοῦσιν; ἢ διὰ τὸ μεγάλην γίνεσθαι τὴν μετα-
 βολήν; τῆς γὰρ συμβαινούσης ὕστερον ἀηδίας
 μεμνημένοι, ὡς αἰτίαν ἢ ἐπλησίασαν φεύγουσιν.

Διὰ τί οἱ ἰππεύοντες συνεχῶς ἀφροδισιαστικῶ-
 15 τεροι γίνονται; ἢ ὅτι διὰ τὴν θερμότητα καὶ τὴν
 κίνησιν ταῦτὸ πάσχουσιν ὅπερ ἐν τῇ ὀμιλίᾳ; διὸ
 καὶ τῇ τῆς ἐπεχούσης ἡλικίας ἐπιδόσει περὶ τὰ
 αἰδοῖα μείζω τὰ μόρια ταῦτα γίνεται. αἰεὶ οὖν τῇ
 κινήσει ταύτῃ χρωμένων εὖροα τὰ σώματα γίνεται
 καὶ προωδοπεποιημένα πρὸς τὸν ἀφροδισιασμόν.

20 Διὰ τί, ὅταν ἄρξωνται ἀφροδισιάζειν δύνασθαι,
 οἱ χρῶτες ὄζουσιν, πρότερον δ' οὐκ ὄζουσι πρὸ
 ἡβῆς οὔτε οἱ ἄνδρες οὔτε αἱ γυναῖκες; ἢ ὅτι τὰ
 ἄπεπτα τοῦς τε χυμοὺς αἰεὶ χείρους ἔχει (ἢ γὰρ
 ὀξύτερος ἢ ἀλμυρωτέρος ἢ πικροτέρος) καὶ τὰς
 ὀσμὰς δυσωδεστέρας, τὰ δὲ πεπεμμένα ἢ γλυκεῖς
 25 ἢ ἥττον ἀγλυκεῖς, καὶ τὰς ὀσμὰς εὐωδεστέρας ἢ
 ἥττον δυσώδεις; τοῦτο δ' ἐστὶ δῆλον ἐπὶ πάντων
 θεωμένοις καὶ φυτῶν καὶ ζώων. ἀφαιρεθέντων
 δὴ τῶν εὐπέπτων, τὰ ὑπολειπόμενα ἄπεπτα, οἷον
 δὴ καὶ ἐπὶ τῆς τέφρας ἀναλωθέντος τοῦ γλυκέος
 30 πικρὰ ἢ κονία, καὶ ὁ ἰδρῶς ἀλμυρός. πέττει δὲ ἡ
 φυσικὴ θερμότης τὸ σπέρμα, ὃ μικρὸν ὄν πολλὴν
 ἔχει δύναμιν· ἐκ πολλοῦ γὰρ ὀλίγον συγκεκεφαλαίω-
 ται. διὸ ὅταν ἀπέλθῃ, ἐκλύονται ὡς ἐπὶ τὸ πολὺ
 μᾶλλον καὶ καταψύχονται· ὥστε ἀπεπτότεροι οἱ
 χυμοὶ γίνονται μᾶλλον, ἀναστομουμένων τῶν πόρων
 35 διὰ τὴν ἔκκρισιν αὐτοῦ. ἀλμυρώτεροι οὖν ἢ οἱ
 τῶν παίδων ἰδρῶτες καὶ δυσωδέστεροι διὰ τὴν
 ἀπεψίαν· καὶ ἐὰν τύχῃ τοιαύτη ἡ φύσις οὔσα ὥστε

PROBLEMS, IV. 10-12

Why do young men, when first they begin to have 10 sexual intercourse, hate those with whom they have associated after the act is over? Is it because there has been a violent change? For remembering their later discomfort they avoid the woman with whom they have associated, as if she were responsible.

Why are men who continually ride more inclined 11 to sexual intercourse? Is it because owing to the heat and movement their condition is the same as during that intercourse? So owing to the growth of the private parts in increasing age these parts grow larger. So owing to the continual movement caused by riding their bodies develop large pores, and so are inclined to sexual intercourse.

Why does the flesh have a very strong smell, when 12 the capacity for sexual intercourse begins, but before this age neither men nor women have a smell? Is it because unconcocted secretion always has a worse taste (for it is either acrid, salt or bitter), and a more unpleasant smell, but concocted matter is always sweet or at least less unpleasant, and has a more pleasant or less unpleasant smell? This is evident to the observer in all plants and animals. When what is properly concocted is removed, the remainder is unconcocted; for instance, when the sweet part is exhausted in ashes, the remaining ash is bitter, and sweat is salt. Now the natural heat concocts the semen, which although small in quantity has great power; for though small it is a large quantity in a concentrated form. So when it leaves the body, men are generally relaxed and chilled; so the juices are less concocted, as the channels are forced open by its passage. So the sweat of adults is saltier and has a worse odour than that of children because it is unconcocted; if then the nature of sweat is such that its

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δυσώδη ἔχειν τὴν ὑπόστασιν τοῦ ἰδρώτος, τούτοις μάλλον ἐπισημαίνει καὶ ἐν τοῖς τόποις τούτοις μάλιστα οἶον μασχάλη, ἐν ᾧ μάλιστα καὶ τοῖς ἄλλοις.

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Διὰ τί, ἐὰν μὲν ἐκ τοῦ σπέρματος τοῦ ἡμετέρου γένηται τὸ ζῶον, τοῦτο ἡμέτερον ἔκγονόν ἐστιν, ἐὰν δὲ ἐξ ἄλλου τινὸς ἢ μέρους ἢ ἀποκρίσεως, οὐχ ἡμέτερον; γίνεται γὰρ σηπομένων πολλὰ καὶ ἐκ τοῦ σπέρματος. τί δὴ οὖν, ἐὰν μὲν τοιοῦτον οἶον ἡμεῖς, ἡμέτερον, ἐὰν δὲ ἀλλότριον, οὐ; ἢ γὰρ ἅπαντα προσήκει ἢ οὐθέν. ἢ πρῶτον μὲν, ὅτι οὕτω μὲν ἐξ ἡμετέρου γίνεται, ἐκείνως δὲ ἐξ ἀλλοτρίου, ὅσα ἐξ ἀποκαθάρματος γίνεται καὶ ἐκκρίσεως; καὶ ὅλως οὐθέν τῶν τοῦ ζώου ζῶον γεννᾶ, ἀλλ' ἢ τὸ σπέρμα. τὸ δὲ βλάπτον καὶ τὸ κακὸν οὐθενός ἐστιν οἰκείον, οὐδὲ τὸ ἀλλότριον· οὐ γὰρ ταῦτὸ τούτου τι εἶναι καὶ τούτου ἀλλότριον ἢ ἕτερον ἢ κακόν. αἱ δὲ ἐκκρίσεις καὶ σήψεις οὐχ ἡμέτερα, ἀλλ' ἕτερα καὶ ἀλλότρια τῆς φύσεως ἡμῶν εἰσίν. οὐ γὰρ ὅσα ἐν τῷ σώματι γίνεται, τοῦ σώματος θετέον, ἐπεὶ καὶ φύματα γίνεται, ἃ ἀφαιροῦσιν καὶ ἐκβάλλουσιν. καὶ ὅλως ὅσα παρὰ φύσιν, πάντα ἀλλότρια· παρὰ φύσιν δὲ πολλὰ καὶ τῶν συγγινομένων ἐστίν. εἰ οὖν ἐκ μόνου τούτου τῶν ἡμετέρων γίνεται ζῶον, ὀρθῶς ἂν τὸ ἐκ τούτου γινόμενον ἔκγονον ἡμέτερον εἶη μόνον. καὶ ἐκ τοῦ σπέρματος δὲ ἂν τι ἄλλο γένηται, οἶον σκώληξ σαπέντος, ἢ καὶ ἐν τῇ μήτρᾳ διαφθαρέντος, οἶον ἃ λέγεται τέρατα, οὐκ ἔκγονα λεκτέον. ὅλως γὰρ ἐκ διεφθαρμένου γινόμενα οὐκέτι ἐξ ἡμετέρου

PROBLEMS, IV. 12-13

sediment has an unpleasant smell, it is more evident in the persons under discussion (adults) and particularly in such places as the armpits, in which it is especially noticeable in others also.

Why is it that, if a living creature is born from our semen, we regard it as our own offspring, but if it proceeds from any other part or excretion, we do not consider it our own? For many things proceed from decayed matter as well as from semen. Why, then, should we regard it as ours if it is like us, but otherwise not? For either all should belong to us or none. Is it, in the first place, because in the former case it proceeds from what is our own but in the latter from something foreign, such as purgation or excretion? Speaking generally, no part of an animal creates another animal except the semen. What is harmful and bad has no kinship with anything, no more has anything foreign; for to be foreign or different or evil is not the same thing as being part of it. Now excretions and putrefactions do not belong to us, but are different and foreign to our nature. For one has no right to attribute to the body everything which is in it, since tumours appear in it which they remove and cast out. Speaking generally, everything which is unnatural is foreign; and many of the things which grow in the body are unnatural. If, then, a living creature originates from semen alone, that which comes from semen should alone be regarded as our offspring. If, then, anything else should be born from our semen, for instance a worm from putrefying semen, or from semen which has decayed in the womb, which produces the so-called monsters, it must not be called our offspring. For in general what arises from corruption no longer arises from what is ours, but from something

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ὄντος γίνεται, ἀλλ' ἐξ ἀλλοτρίου, ὥσπερ τὰ ἐκ τῶν ἀποκρίσεων, οἷον τὸ ἐκ τῆς κόπρου. σημεῖον δὲ
 25 ὅτι ἐκ διαφθειρομένου πάντα τὰ τοιαῦτα γίνεται· μὴ ἐκ διαφθειρομένου γὰρ τοιοῦτον πέφυκε γίνεσθαι, οἷον ἂν ἢ ἐξ οὗ τὸ σπέρμα, ἔαν ἐξ ἵππου, ἵππος, ἔαν δὲ ἐξ ἀνθρώπου, ἄνθρωπος. καὶ αὐτότε οὐ τιμῶμεν τὸ σπέρμα, οὐδὲ πᾶν τὸ ἐν τῇ γενέσει περαινόμενον (καὶ γὰρ ὑγρὸν καὶ ὄγκος
 30 τις καὶ σὰρξ γίνεταιί ποτε), διὰ¹ τὸ μήπω ἔχειν τὴν φύσιν, ἀλλ' ἢ τοσοῦτον μόνον τῆς φύσεως, ὅτι οὕτω διάκειται ὥστε γενέσθαι ἐξ αὐτοῦ τοιοῦτον οἷον ἡμεῖς· ἐκ δὲ διεφθαρμένου οὐδὲ τοιοῦτον. διὰ ταῦτα οὔτε ἐξ ἑτέρου τῶν ἐν ἡμῖν οὔτε ἐκ τούτου διεφθαρμένου ἢ ἀτελῶς ἔχοντος τὸ ἔκγονόν ἐστιν ἡμέτερον.

85 Διὰ τί ἐν τῷ ὕδατι ἦττον δύνανται ἀφροδισιάζειν 14 οἱ ἄνθρωποι; ἢ ὅτι ἐν ὕδατι οὐδὲν τήκεται, ὅσα ὑπὸ πυρὸς τήκεται, οἷον μόλιβδος ἢ κηρός· ἢ δὲ γονὴ τηκομένη φαίνεται πυρί· πρὶν μὲν γὰρ ἢ τρίψις ἐκθερμάνη, οὐ τήκεται. οἱ δὲ ἰχθύες οὐ τρίψει ὀχεύουσιν.

878 b Διὰ τί τὸ ἀφροδισιάζειν ἡδιστον, καὶ πότερον ἐξ 15 ἀνάγκης ἢ ἔνεκά τινος ὑπάρχει τοῖς ζώοις; ἢ ἡδὺ μὲν ἐστιν ἦτοι διὰ τὸ ἀπὸ παντὸς τοῦ σώματος ἀπιέναι τὸ σπέρμα, ὥσπερ τινές φασιν; ἢ καὶ ἀπὸ
 5 παντὸς μὲν μὴ ἀπιέναι, διὰ δὲ τοιούτου εἰς ὃ πάντες συντείνουσιν οἱ πόροι τῶν φλεβῶν; οὔσης οὖν τῆς ἡδονῆς ὁμοίας τῆς ἐν τῷ κνησμῷ, τοῦτο συμβαίνει γίνεσθαι ὥσπερ δι' ὄλου τοῦ σώματος. ὁ δὲ κνησμὸς ἡδύς ἐστιν, ὑγροῦ ἔξοδος πνευματώδους ἐγκατακεκλεισμένου παρὰ φύσιν. ἢ δὲ γονὴ
 10 τοιούτου εἰς τὸ κατὰ φύσιν ἔξοδος. ἔστι δὲ καὶ

¹ Omitting δὲ after ποτε.

PROBLEMS, IV. 13-15

foreign, like those things which arise from excretion—for instance from dung. There is proof that all such things arise from corruption; for from what is not corrupted there springs only something of the same type as the seed—a horse from a horse, and a man from a man. And it is not the semen itself which we value, nor anything which is being perfected in the process of becoming (for at one moment it is moisture and mere mass and flesh that is coming into being), because it has not yet achieved its nature, but only so much of its nature that it is in a condition in which something may be born from it of the same kind as ourselves; but from corrupted matter no such thing can come. Consequently neither what springs from any other part of us, nor what springs from that part corrupted or imperfect is regarded as our own offspring.

Why are men less capable of sexual intercourse in 14 water? Is it because nothing which is melted by heat melts in water, such as lead and wax? Now the semen is evidently melted by heat; for it does not melt until friction warms it. Fishes do not have intercourse by friction.

Why is sexual intercourse very pleasant, and does 15 it occur among living creatures because it is necessary or for another reason? Is the pleasure due to the fact that the semen is drawn from all parts of the body, as some say, or does it not come from all parts, but only through that part to which all the passages of the veins lead? As the pleasure from the friction is the same in both cases, it must pass through the whole body. Such friction is pleasant, as the vaporous moisture which is unnaturally enclosed escapes. But the act of generation is an emission of such matter for its own proper purpose. It is, therefore, pleasant

ἐξ ἀνάγκης ἠδὺ καὶ ἔνεκά τινος, ἐξ ἀνάγκης μὲν ὅτι ἢ εἰς τὸ κατὰ φύσιν ὁδὸς ἠδὺ ἐστίν, εἰς τὴν αἰσθητήν, ἔνεκα δὲ τινος ἵνα γένεσις ἢ ζῶων· διὰ γὰρ τὴν ἠδονὴν μᾶλλον ὁρμᾶ πρὸς τὴν μίξιν τὰ ζῶα.

Διὰ τί ἡ λαγνεΐα πρὸς νοσήματ' ἔνια τῶν ἀπὸ 16
15 φλέγματος συμφέρει; ἢ ὅτι περιττώματός ἐστιν ἔξοδος, ὥστε συνεκκρίνεται πολλὴ περίπτωσις; τὸ δὲ φλέγμα περίπτωμα.

Διὰ τί τὰ ἀφροδίσια τὴν κοιλίαν ψύχει καὶ 17
ξηραίνει; ἢ ψύχει μὲν, ὅτι ἐκκρίνεται τὸ θερμὸν ἐν τῇ μίξει; ξηραίνει δὲ καὶ ἡ μίξις· ἐξατμίζεται
20 γὰρ τοῦ θερμοῦ ἐξιόντος, ἐξέρχεται δὲ ψυχομένου. ἔτι καὶ ἡ θερμότης ἐν τῇ ὁμιλίᾳ ξηραίνει.

Διὰ τί, ὅσοις αἱ βλεφαρίδες ρέουσι, λάγνοι; ἢ 18
διὰ τὸ αὐτὸ καὶ διότι οἱ φαλακροί; ἔστι γὰρ μόρια ἄμφω ταῦτα τοῦ αὐτοῦ. ἔστι δὲ τὸ αἴτιον·
25 ὅποσαι πρεσβυτέρου γινομένου μὴ αὐξάνονται τῶν συγγενικῶν τριχῶν, ἅπασαι τοῦτο πάσχουσιν ἐν ταῖς λαγνεΐαις. κεφαλὴ γὰρ καὶ ὄφρυς καὶ βλεφαρίς συγγενικαὶ τρίχες. τούτων δὲ μόνον ἐνίοις αἱ ὄφρυες δασύνονται πρεσβυτέροις γινομένοις (δι' ἣν δὲ αἰτίαν, εἴρηται ἐν ἄλλοις), αἱ ἕτεραι δὲ διὰ
30 τὸ αὐτὸ ἄμφω λείπουσιν. αἴτιον δὲ ὅτι καταψύχει τὰ ἄνω ἢ λαγνεΐα ὀλίγαιμα ὄντα, ὥστε οὐ πέττει τὴν τροφήν ὁ τόπος· οὐ λαμβάνουσαι δὲ τροφήν ἐκρέουσιν αἱ τρίχες.

Διὰ τί οὐρητιῶντες οὐ δύνανται ἀφροδισιάζειν; 19
ἢ ὅτι πλήρεις γίνονται οἱ πόροι; τὸ δὲ πλήρες
35 ὑγροῦ οὐ δέχεται ἄλλο ὑγρόν.

Διὰ τί αἱ ἰξίαι τοὺς ἔχοντας κωλύουσι γεννᾶν, 20

^a Cf. 658 b 19.

PROBLEMS, IV. 15-20

both because it is necessary and also for another reason ; necessary, because the passage out of semen for its natural purpose is pleasant, if it produces sensation, and also for another purpose, that there may be procreation of living creatures. For owing to the pleasure derived living creatures are more inclined to have intercourse.

Why is lust beneficial for some of the diseases which 16 arise from phlegm ? Is it because it involves an emission of waste product, so that much waste is excreted with it ? And phlegm is waste product.

Why does sexual intercourse chill and dry the 17 stomach ? Does it produce chill because heat is given off in the sexual act ? But the act also produces dryness ; for as the heat comes out evaporation takes place, and escapes as the body grows cool. Also the heat in intercourse causes dryness.

Why are those lustful whose eyelashes fall out ? Is 18 it for the same reason as that for which the bald are also lustful ? For both hair and eyelashes belong to the same region of the body. The reason is this. All the natural hair, which does not grow as a man gets older, falls off owing to lustfulness. For the hair on the head, eyebrows and eyelids is all natural hair. But it is only some men whose eyebrows get bushy as they grow older (the reason for this has been explained elsewhere ^a), but the other hairy parts fail for the same reason. The reason is that lust cools the upper parts which contain but little blood, so that this region does not concoct the nourishment ; as they do not receive nourishment, the hairs fall out.

Why cannot those who wish to make water have 19 sexual intercourse ? Is it because the passages are full ? What is already full of moisture cannot contain more moisture.

Why does varicocele prevent generation both in 20

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καὶ ἀνθρώπους καὶ τῶν ἄλλων ζώων ὅ τι ἂν ἔχη;
ἢ ὅτι ἡ ἰξία γίνεται μεταστάντος πνεύματος· διὸ
καὶ ὠφελεῖ πρὸς τὰ μελαγχολικά. ἔστι δὲ καὶ ὁ
879 a ἀφροδισιασμός μετὰ πνεύματος ἐξόδου. εἰ οὖν
ὀδοποιεῖται ἢ ὄρμη γινομένου αὐτοῦ, οὐ ποιεῖ
ὄρμᾶν τὸ σπέρμα, ἀλλὰ καταψύχεται· μαραίνει
οὖν τὴν συντονίαν τοῦ αἰδοίου.

Διὰ τί οἱ ἀφροδισιάζοντες ἐκλύονται καὶ ἀσθενέ- 21
5 στεροι γίνονται ὡς ἐπὶ τὸ πολὺ; πότερον διὰ τὸ
ἀπὸ πάντων ἔκκρισιν εἶναι τὸ σπέρμα, ὥστε
οἶον οἰκοδομήματος αἱ ἀρμονίαι, καὶ τοῦ σώματος
οὕτω σειομένη ἢ σύνθεσις ἔστι τῷ ἀπεληλυθέναι
τι, οἶον εἰ τὸ αἷμα ἐξέλθοι ἢ πᾶν ἢ τι [ἄλλο]¹ μέρος.
οὕτω σφόδρα ἐπίκαιρον τὸ ἐξιόν ἔστιν, καὶ ὁ ἐκ
10 πολλῆς γίνεται τροφῆς ὀλίγον, οἶον τὸ ἀμύλιον ἐκ
τοῦ σταιτός.

Διὰ τί οἱ ἀφροδισιάζοντες καὶ οὐρητιῶντες 22
ἐντείνουσιν; ἢ ὅτι πληρουμένων τῶν πόρων ὑγρό-
τητος, τὸ σπέρμα ὑπεξιὸν ἐν ἐλάττονι τόπῳ
πλείονά τε ὄγκον ποιεῖ καὶ αἶρει; ἐπίκειται γὰρ
τὸ αἰδοῖον ἐπὶ τοῖς πόροις.

15 Διὰ τί ἡ σύντασις γίνεται τοῦ αἰδοίου καὶ ἡ 23
αὔξησις; ἢ διὰ δύο, διὰ τε τὸ βάρος ἐπιγίνεσθαι
ἐν τῷ ὀπισθεν τῶν ὄρχεων αἶρεται (ὑπομόχλιον γὰρ
οἱ ὄρχεις γίνονται) καὶ διὰ τὸ πνεύματος πληροῦσθαι
τοὺς πόρους. ἢ τοῦ ὑγροῦ αὔξανομένου καὶ μεθ-
20 ισταμένου ἢ ἐξ ὑγροῦ γινομένου ὁ ὄγκος μείζων
γίνεται; τὰ λίαν δὲ μεγάλα ἦττον αἶρεται διὰ τὸ
πορρωτέρῳ τὸ βάρος τοῦ ὑπομοχλίου γίνεσθαι.

Διὰ τί οἱ ἀφροδισιάζοντες ἢ οἱ τοιοῦτοι δυσώδεις, 24
οἱ δὲ παῖδες οὐ; καὶ τοῦ καλουμένου γράσου

¹ Omitting [ἄλλο].

PROBLEMS, IV. 20-24

men and in the other animals who have it? Is it because varicocele occurs when the breath changes position? That is why it benefits cases of melancholia. Now the sexual act is also combined with an emission of breath. If, therefore, the onrush of the breath moves along when intercourse is taking place, it does not cause movement in the semen but chills it; so it weakens the tension of the parts.

Why do those who indulge in sexual intercourse 21 usually become slack and weaker? Is it because the excretion of semen comes from all parts, so that, as in the general harmony of a building, the balance of the body is disturbed by losing something, as would be the case if blood escaped either entirely or in part. What comes out is so important and very little is formed from a considerable amount of nourishment, like fine meal cake from flour.

Why are those who are having sexual intercourse 22 at a time when they wish to make water in a state of tension? Is it because, as the passages are full of moisture, the semen travelling out along a narrower passage produces considerable swelling and raises the penis; for it lies close to these passages?

Why does tension and swelling of the penis occur? 23 Is it for two reasons: because it is raised by the weight behind the testicles (for the testicles act as a fulcrum), and also because the passages are full of air? Or does the swelling become greater as the moisture increases and changes position, or as it forms? Specially heavy weights are less easily raised because the weight is at a greater distance from the fulcrum.

Why do those who have sexual intercourse and 24 persons capable of it have an evil smell, whereas children do not? They have what is called a goat-

879 a ὄζουσιν. ἢ τῶν πνευμάτων, ὥσπερ εἴρηται, τὰ
 25 μὲν τῶν παιδίων πέττει τὸ ὑγρὸν καὶ τοὺς ἰδρῶτας,
 οἱ δὲ τῶν ἀνδρῶν ἄπεπτοι;

Διὰ τί ἐν τῷ θέρει οἱ μὲν ἄνδρες ἤττον δύνανται 25
 ἀφροδισιάζειν, αἱ δὲ γυναῖκες μᾶλλον, καθάπερ καὶ
 ὁ ποιητὴς λέγει ἐπὶ τῷ σκολύμῳ “μαχλόταται δὲ
 γυναῖκες, ἀφαιρότατοι δὲ τοὶ ἄνδρες.” πότερον
 30 ὅτι οἱ ὄρχεις καθιένται μᾶλλον ἢ ἐν τῷ χειμῶνι;
 ἀνάγκη δέ, εἰ μέλλει ἀφροδισιάζειν, ἀνασπάσαι.
 ἢ ὅτι αἱ θερμαὶ φύσεις ἐν τῷ θέρει συμπίπτουσιν
 ὑπερβάλλοντος τοῦ θερμοῦ, αἱ δὲ ψυχραὶ θάλλουσιν;¹
 ἔστι δὲ ὁ μὲν ἀνὴρ ξηρὸς καὶ θερμὸς, ἡ δὲ γυνὴ
 ψυχρὰ καὶ ὑγρά. τοῦ μὲν ἀνδρὸς οὖν ἡμαύρωται
 35 ἡ δύναμις, τῶν δὲ θάλλει ἐπανισουμένη τῷ ἐναντίῳ.

Διὰ τί ἐνίοι ἀφροδισιαζόμενοι χαίρουσι, καὶ οἱ 26
 μὲν ἅμα δρῶντες, οἱ δ' οὐ; ἢ ὅτι ἔστιν ἐκάστη
 879 b περιττώσει τόπος εἰς ὃν πέφυκεν ἀποκρίνεσθαι
 κατὰ φύσιν, καὶ πόνου ἐγγινομένου τὸ πνεῦμα
 ἐξιὸν ἀνοιδεῖν ποιεῖ, καὶ συνεκκρίνει αὐτήν, οἷον
 τὸ μὲν οὖρον εἰς κύστιν, ἡ δ' ἐξικμασμένη τροφή
 εἰς κοιλίαν, τὸ δὲ δάκρυον εἰς ὄμματα, μύξαι δ'
 5 εἰς μυκτῆρας, αἷμα δὲ εἰς φλέβας; ὁμοίως δὲ
 τούτοις καὶ ἡ γονὴ εἰς ὄρχεις καὶ αἰδοῖα. οἷς δὲ
 οἱ πόροι μὴ κατὰ φύσιν ἔχουσιν, [ἀλλ'] ἢ διὰ τὸ
 ἐπιτυφλωθῆναι τοὺς εἰς τὸ αἰδοῖον, οἷον συμβαίνει
 τοῖς εὐνούχοις καὶ εὐνουχίαις, ἢ καὶ ἄλλως, εἰς τὴν
 ἔδραν συρρεῖ ἡ τοιαύτη ἰκμάς· καὶ γὰρ διεξέρχεται
 10 ταύτη. σημεῖον δ' ἐν τῇ συνουσίᾳ ἡ συναγωγὴ
 τοῦ τοιούτου τόπου καὶ ἡ σύντηξις τῶν περὶ τὴν
 ἔδραν. εἰ οὖν ὑπερβάλλῃ τις τῇ λαγνεΐᾳ, τούτοις
 ἐνταῦθα συνέρχεται, ὥστε ὅταν ἡ ἐπιθυμία γένηται,

¹ θάλλουσιν Richards : θάλπουσιν Ruelle.

PROBLEMS, IV. 24-26

smell. Is it because, as has been said, the breath in children concocts the moisture and sweat, but in men these are not concocted?

Why are men less capable of sexual intercourse in 25 summer, but women more so; as the poet says of the time when the thistle blooms "Women are most wanton and men most feeble."^a Is it because the testicles hang down more than in winter? Now they must be drawn up for sexual intercourse. Or is it because hot natures collapse in the summer by excess of heat, but the cold ones flourish? Now a man is dry and hot, but a woman is cold and moist. So the power of the man is diminished at that time, but that of women flourishes because it is balanced by its contrary.

Why do some men enjoy sexual intercourse when 26 they play an active part and some when they do not? Is it because for each waste product there is a place into which it naturally secretes, and, when energy is employed, the breath, as it passes out, causes swelling, and expels the waste product; for instance urine passes into the bladder, and desiccated food into the stomach, tears into the eyes, mucus into the nostrils, and blood into the veins? Just in the same way semen passes into the testicles and privates. In those whose passages are not in a natural condition, but either because those leading to the testicles are blocked, as occurs with eunuchs and in other impotent persons, or for some other reason, such moisture flows into the fundament; for it passes in this direction. This is proved by the contraction of this part in intercourse and the wasting of the parts about the fundament. If then a man indulges in sexual intercourse to excess, the semen collects in these parts, so that

^a Hesiod, *Works and Days*, 586.

τοῦτ' ἐπιθυμεί τῆς τρίψεως εἰς ὃ συλλέγεται. ἢ
 δ' ἐπιθυμία καὶ ἀπὸ σιτίων καὶ ἀπὸ διανοίας
 15 γίνεται. ὅταν γὰρ κινηθῆ ὑφ' ὄτουον, ἐνταῦθα
 τὸ πνεῦμα συντρέχει, καὶ τὸ τοιοῦτο περίπτωμα
 συρρεῖ οὐ πέφυκεν. καὶ μὲν λεπτὸν ἢ ἢ πνευμα-
 τῶδες, τούτου ἐξελθόντος, ὥσπερ αἱ συντάσεις
 τοῖς παισὶ καὶ τοῖς ἐν ἡλικίᾳ, ἐνίοτε οὐθενὸς
 ὑγροῦ ἐκκριθέντος, παύονται. ὅταν δὲ κατασβεσθῆ
 20 τὸ ὑγρὸν * * * εἰ δὲ μηδέτερον τούτων πάθη,
 ἐπιθυμεί ἕως ἄν τι τούτων συμβῆ. οἱ δὲ φύσει
 θηλυδρία οὕτω συνεστᾶσιν ὥστ' ἐκεῖ μὲν μὴ
 ἐκκρίνεσθαι ἢ ὀλίγην, οὐπὲρ τοῖς ἔχουσι κατὰ
 φύσιν ἐκκρίνεται, εἰς δὲ τὸν τόπον τοῦτον. αἴτιον
 δέ, ὅτι παρὰ φύσιν συνεστᾶσιν· ἄρσενες γὰρ ὄντες
 25 οὕτω διάκεινται ὥστε ἀνάγκη τὸν τόπον τοῦτον
 πεπηρῶσθαι αὐτῶν. πήρωσις δὲ ἢ μὲν ὄλως ποιεῖ
 φθόρον, ἢ δὲ διαστροφὴν. ἐκείνη μὲν οὖν οὐκ
 ἔστιν· γυνὴ γὰρ ἂν ἐγένετο. ἀνάγκη ἄρα παρ-
 εστράφθαι καὶ ἄλλοθί που ὄρμᾶν τῆς γονικῆς ἐκ-
 κρίσεως. διὸ καὶ ἄπληστοι, ὥσπερ αἱ γυναῖκες·
 ὀλίγη γὰρ ἢ ἰκμάς, καὶ οὐ βιάζεται ἐξιέναι, καὶ
 30 καταψύχεται ταχύ. καὶ ὅσοις μὲν ἐπὶ τὴν ἔδραν,
 οὗτοι πάσχειν ἐπιθυμοῦσιν, ὅσοις δ' ἐπ' ἀμφοτέρα,
 οὗτοι καὶ δρᾶν καὶ πάσχειν· ἐφ' ὁπότερα δὲ πλείον,
 τούτου μᾶλλον ἐπιθυμοῦσιν. ἐνίοις δὲ γίνεται καὶ
 ἐξ ἔθους τὸ πάθος τοῦτο. ὅσα γὰρ ἂν ποιῶσιν
 35 συμβαίνει αὐτοῖς χαίρειν καὶ προῖεσθαι τὴν γονὴν
 οὕτως. ἐπιθυμοῦσιν οὖν ποιεῖν οἷς ἂν ταῦτα
 γίνηται, καὶ μᾶλλον τὸ ἔθος ὥσπερ φύσις γίνεται.
 διὰ τοῦτο ὅσοι ἂν μὴ πρὸ ἡβης, ἀλλὰ περὶ ἡβην

^a Some such words must be supplied in the lacuna.

^b i.e. the fundament.

when desire comes, then that part desires friction in which it is collected. The desire arises partly from food and partly from imagination. For when he is excited by anything, the breath races to that part and such waste product flows into its natural place. If, then, it is light or full of breath, when this passes out, the tension ceases without the emission of moisture, as it does sometimes both with boys and adults. (This also occurs ^a) when the moisture dries up. If, however, neither of these results occurs, desire continues until one of them happens. But the naturally effeminate are so circumstanced that little or no secretion occurs in the place in which it occurs with normal persons, but it is secreted in this region.^b The reason is that such persons are unnaturally constituted; for though they are male this part of them has become maimed. Such maiming produces either complete destruction or a distortion of type. The former is impossible in their case for it would imply their becoming female. So it must involve distortion and an impulse in some direction other than the discharge of semen. So they are unsatisfied, like women; for the moisture is slight and does not force an exit and is quickly chilled. Those with whom the semen travels to the fundament desire to be passive, and those with whom it settles in both places desire to be both active and passive in sexual intercourse; in whichever direction it inclines the more, so do their desires. In some cases this state is the result of habit. For men are accustomed to enjoy what they normally do, and to emit semen accordingly. So they desire to do that by which this may occur and so habit tends to become second nature. For this reason those who have not been accustomed to submit to sexual inter-

880 a ἐθισθῶσιν ἀφροδισιάζεσθαι, διὰ τὸ γίνεσθαι αὐτοῖς
 ἐν τῇ χρεῖᾳ τὴν μνήμην, ἅμα δὲ τῇ μνήμῃ τὴν
 ἡδονήν, διὰ δὲ τὸ ἔθος ὥσπερ πεφυκότες ἐπι-
 θυμοῦσι πάσχειν, τὰ μέντοι πολλὰ καὶ τὸ ἔθος
 5 ὥσπερ πεφυκῶσι γίνεται. εἰ δὲ τύχη λάγνος ὦν
 καὶ μαλακός, καὶ θᾶπτον ἕκαστα τούτων συμβαίνει.

Διὰ τί μάλιστα αἰσχύνονται ὁμολογεῖν οἱ ἐπι- 27
 θυμοῦντες ἀφροδισιάζεσθαι, ἀλλ' οὐ πιεῖν οὐδὲ
 φαγεῖν οὐδὲ ἄλλο τῶν τοιούτων οὐδέν; ἢ ὅτι τῶν
 μὲν πλείστων ἀναγκαῖαι αἱ ἐπιθυμίαι, ἔνια δὲ καὶ
 10 ἀναιρεῖ τοὺς μὴ τυγχάνοντας· ἢ δὲ τῶν ἀφροδισίων
 ἐκ περιουσίας ἐστίν.

Διὰ τί οἱ μὲν ἄνδρες τοῦ χειμῶνος, αἱ δὲ γυναῖκες 28
 τοῦ θέρους ὀρμητικώτεραι πρὸς τὰ ἀφροδίσια; ἢ
 ὅτι οἱ μὲν ἄνδρες θερμοὶ μᾶλλον καὶ ξηροὶ τὰς
 φύσεις, αἱ δὲ γυναῖκες ὑγραὶ καὶ κατεψυγμέναι;
 15 τοῖς μὲν οὖν τὸ ὑγρὸν καὶ τὸ θερμὸν αὐτάρκες πρὸς
 τὴν ὀρμὴν τοῦ χειμῶνος (ἢ δὲ τοῦ σπέρματος
 γένεσις ἐκ τούτων), ταῖς δὲ τὸ θερμὸν ἔλαττον καὶ
 τὸ ὑγρὸν ἐστι πεπηγὸς διὰ τὴν ἔνδειαν τοῦ πυρός·
 τοῦτο δὲ θέρους. ταῖς μὲν οὖν σύμμετρον τὸ
 θερμὸν, τοῖς δὲ πλεόν τοῦ ἱκανοῦ· τὸ γὰρ ἄγαν πολὺ
 20 ἐκλύει τῆς δυνάμεως. διὸ καὶ τὰ παιδιά τοῦ
 θέρους λεπτότερα· συμβαίνει γὰρ πῦρ ἐπὶ πῦρ
 φέρειν.

Διὰ τί ὅσοι θερμοὶ τὴν φύσιν, εἰς ἰσχυροὶ ὦσι 29
 καὶ εὐτραφεῖς, εἰς μὴ ἀφροδισιάσωσι, χολή τε
 προῖσταται αὐτοῖς πολλάκις καὶ ἔκπικρον ὑποχωρεῖ
 25 καὶ φλέγμα ἄλμυρόν γίνεται, καὶ ἀλλοχροοῦσιν;
 ἢ ὅτι μετὰ τοῦ σπέρματος αἰεὶ περίττωμα συναπ-
 ἔρχεται; διὸ καὶ ἐνίοις τῶν περιττωματικῶν¹ ἰχθύ-
 ων πλύντρου ὄζει ἢ γονή. ἀφροδισιάζουσι μὲν οὖν

¹ περιττωματικῶν Forster from Th. G.: πνευματικῶν Ruelle.

PROBLEMS, IV. 26-29

course before puberty but at about that time, because they have recollection of their enjoyment and pleasure is associated with the recollection, because of their habit desire the passive state, as if it were natural, numerous occasions and habit having the same effect as nature. If a man happens to be both lustful and effeminate, this is all the more likely to occur.

Why are those who desire to submit to sexual 27 intercourse greatly ashamed to admit it, whereas they are not ashamed to admit a desire for eating or drinking or any other similar thing? Is it because desire for most things is necessary, and some desires kill those who do not indulge them; but the desire for sexual intercourse is superfluous?

Why are men more inclined for sexual intercourse 28 in winter and women in summer? Is it because men are naturally inclined to be hot and dry, but women are moist and chilled? In men the moisture and warmth lead to desire in the winter (the production of semen arises from these), but in women the heat is less and the moisture is congealed owing to lack of warmth; and this occurs in summer. In women the heat is balanced, but in men it is more than sufficient; and its excess weakens much of their power. So also children are thinner in summer, for it is a case of adding fire to fire.

Why is it that those who are hot by nature, if they 29 are strong and well nourished, often suffer from bile, if they do not have sexual intercourse? The bile which passes is bitter, and salty phlegm is formed, and their complexion changes. Is it because waste product always passes out with the semen? This is why semen of those who are full of waste matter often smells of water in which fish has been washed. When

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τοῦτο συναπέρχεται, ὥστ' οὐ λυπεῖ· μὴ ἀπτομένοις δὲ τῆς ὀμιλίας τὸ περίπτωμα ἐκπικροῦται ἢ ἀλμυρὸν γίνεται.

30 Διὰ τί ἀφροδισιαστικοὶ οἱ μελαγχολικοί; ἢ ὅτι 30 πνευματώδεις, τὸ δὲ σπέρμα πνεύματος ἔξοδος ἐστίν; οἷς οὖν πολὺ τοιοῦτον, ἀνάγκη πολλάκις ἐπιθυμεῖν τούτους ἀποκαθαίρεσθαι· κουφίζονται γάρ.

Διὰ τί καὶ οἱ ὄρνιθες καὶ οἱ δασεῖς ἄνθρωποι 31 35 λάγνοι; πότερον ὅτι ὑγρότητα ἔχουσιν πολλήν; ἢ οὐ (τὸ γὰρ θῆλυ ὑγρὸν μὲν, ἀλλ' οὐ δασύ), ἀλλ' ὅτι ἀμφότεραι αἱ φύσεις πεπτικάι πολλῆς ὑγρότητος διὰ θερμότητα; σημεῖον δὲ αἱ τρίχες καὶ τὰ πτερά. ἢ ὅτι πολὺ τὸ ὑγρὸν, καὶ κρατεῖται ὑπὸ τοῦ θερμοῦ; 880 b οὔτε γὰρ ἂν μὴ πολλῆς οὔσης τῆς ὑγρότητος οὔτε μὴ κρατουμένης ἐξεφύετο τοῖς μὲν αἱ τρίχες, τοῖς δὲ τὰ πτερά. τὸ δὲ σπέρμα γίνεται ἐν τοῖς τοιούτοις πλείστον καὶ τόποις καὶ ὥραις, οἷον ἐν τῷ ἔαρι· ἢ γὰρ φύσις αὐτοῦ ὑγρά καὶ θερμή. διὰ 5 ταῦτό δὲ καὶ οἱ ὄρνιθες λάγνοι καὶ οἱ χωλοί· ἢ γὰρ τροφή ἀμφοτέροις κάτω μὲν ὀλίγη διὰ τὴν ἀναπηρίαν τῶν σκελῶν, εἰς δὲ τὸν ἄνω τόπον ἔρχεται καὶ εἰς σπέρμα συγκρίνεται.

Διὰ τί, ἐὰν ἀφροδισιάζῃ ὁ ἄνθρωπος, οἱ ὀφθαλμοὶ 32 ἀσθενοῦσι μάλιστα; ἢ δῆλον ὅτι ἀπολείποντος τοῦ 10 ὑγροῦ τοῦτο γίνεται; τεκμήριον δ' ὅτι ἡ γονὴ ψυχρά ἐστίν· οὐ γὰρ γίνεται ὑγρά, ἐὰν μὴ διαθερμάνῃ τὰ θερμά. οὐδὲ δεῖται τήξεως· κέχυται γὰρ ἐν τῷ ἀνθρώπῳ ὥσπερ τὸ αἷμα.

men have sexual intercourse this waste product passes out as well, so that it causes no discomfort ; but if they have no such connexion, the waste product grows bitter or becomes salt.

Why are the melancholic inclined to sexual inter- 30 course ? Is it because they are full of breath, and semen is an emission of breath ? Those therefore who have a quantity of semen which is full of breath must often desire to be purged of it ; for by this means they are relieved.

Why are birds and hairy men lustful ? Is it because 31 they contain much moisture ? Or is this not so (for the female is moist, but not hairy), but is it because both natures concoct considerable moisture owing to heat ? Hair and feathers prove this. Or is it because the moisture is considerable and is mastered by the heat ? For if there were not much moisture, or if it were not controlled, men would not have hair nor birds feathers. In such the semen becomes very plentiful when places and seasons are of such a character, as for instance in spring ; for its character is moist and hot. Both birds and lame men are lustful for the same reason ; for in both the nourishment below is small owing to the deficiencies of their legs, so it passes into the upper region and forms secretion of semen.

Why is it that, if a man indulges in sexual inter- 32 course, his eyes grow very weak ? Is it clear that it is due to failure of moisture ? The fact that semen is cold is evidence of this ; for it does not become moist, unless the heat warms it up. Nor does it need melting ; for it flows in a man just like the blood.

Ε ΘΣΑ ΛΠΘ ΚΟΠΟΥ

880 11 Διὰ τί μακροὶ μὲν ὄντες οἱ περίπατοι ἐν τοῖς 1
ὄμαλέσιν κοπιαιώτεροί εἰσιν τῶν ἀνωμάτων,
βραχεῖς δὲ ἀκοπώτεροι; ἢ ὅτι ἢ τε πολλὴ κίνησις
ποιεῖ κόπον καὶ ἢ ἰσχυρά; τοιαύτη δὲ ἢ σπα-
σματώδης, πολλὴ δὲ ἢ συνεχῆς καὶ μία. ἐν μὲν
οὖν τοῖς ἀνάντεσιν, εἴαν ἢ μακρά, ἀνάπαυσις γίνεται
20 ἢ μεταβολή, καὶ οὐ μακρὰ ἢ κίνησις, οὐδὲ ἵππων
αὐτῶν, διὰ τὴν μεταβολήν· ἐν δὲ τοῖς ὄμαλέσιν ἢ
ὁμοιότης τοῦ σχήματος οὐ διαλαμβάνει οὐδὲ ἀνα-
παύει τὰ μέρη, ἀλλὰ συνεργάζεται πρὸς τὸ συνεχῆ
τὴν κίνησιν εἶναι. ὅταν δὲ ἢ βραχεῖα, διὰ μὲν τὸ
21 πλῆθος τῆς κινήσεως ἐν τοῖς ἐπιπέδοις οὐ γίνεται
κόπος· ἐν δὲ τοῖς ἀνάντεσι διὰ τὸ τὴν μεταβολήν
ἰσχυρὰν γίνεσθαι καὶ ἐναντίαν, ὅτε μὲν ἄνω ὅτε
δὲ κάτω, ποιεῖ κόπον. τοιαύτη δέ, ὡς φασί, ἐν
τοῖς ἀνάντεσιν, ἐν δὲ τοῖς πεδινοῖς τοῦναντίον.

Διὰ τί τοῖς λειποψυχοῦσιν καὶ τοῖς ἐκ τῶν γυμ- 2
80 νασίων ὀαλυομένοις ἐλάττους τε οἱ ὄγκοι καὶ
ὀξύτεροι δοκοῦσιν εἶναι αἱ φωναί; ἢ ὅτι αἶ τε
φωναὶ ἐλάττους φαινόμεναι ὀξύτεροι φαίνονται

BOOK V

ON FATIGUE

Why are long walks on level ground more tiring than 1 on uneven ground, but short ones are less tiring? Is it because weariness is produced by great and violent movement? By violent movement I mean spasmodic movement, and by great movement continuous movement of the same kind. In climbing hills, if they are long, the change of movement constitutes a rest, and the movement is not continued for long, even with horses, because there is a change; but on level ground the similarity of position gives no change and affords no rest to the limbs, but contributes towards making the movement continuous. But when it is short, no weariness is caused by long continued movement on level ground; but on hills, because the change of movement is violent and contradictory, sometimes upwards and sometimes downwards, weariness follows. Such in our opinion is the type of movement on hills, but on level ground it is just the opposite.

Why do those who faint and become exhausted 2 after gymnastic exercise seem to grow smaller in bulk, and their voices more shrill? Is it because their voices appear more shrill because they become fainter?

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(σημεῖον δὲ ὅτι μιμούμενοι τοὺς πόρρωθεν ὄξυ φθέγγονται) καὶ οἱ ὄγκοι ἐλάττους;

Διὰ τί ἡ γαστήρ μόνον λεπτύνεται τῶν γυμνα-
 85 ζομένων; ἢ ὅτι πλείστη ἡ πιμελή περὶ τὴν
 γαστέρα;

Διὰ τί τὸ πῖον τετριμμένον γίνεται τοῖς πονοῦσιν;
 ἢ διότι τὸ πῖον τήκεται θερμαινόμενον, ἢ δὲ
 κίνησις θερμαίνει, ἢ δὲ σὰρξ οὐ τήκεται.

Διὰ τί δὲ τὰ περὶ τὴν κοιλίαν πιότατα; πότερον
 881 α ὅτι ἐγγύς ἐστι τῆς τροφῆς; ἐν ὄσω οὖν τὰλλα
 παρ' ἐκείνης λαμβάνει, αὐτὴ πολλάκις λαμβάνει.
 ἢ ὅτι ἡκιστα πονεῖ; καμπὰς γὰρ οὐκ ἔχει.

Διὰ τί οἱ κόποι μᾶλλον παύονται, ὅταν τις τῷ
 β ἐλαίῳ ὕδωρ συμμίξας ἀνατρέψῃται; ἢ ὅτι μᾶλλον
 εἰσδύεται τὸ ἔλαιον μετὰ τοῦ ὕδατος; ἐὰν δὲ αὐτὸ
 καθ' αὐτὸ ἦ, οὐχ ὁμοίως παρεισδύνει διὰ τὸ ἐπι-
 πολαστικὸν εἶναι. μᾶλλον οὖν μαλάττεται τὸ σῶμα
 εἰσδυομένου, ἐπεὶ τὸ ἔλαιόν ἐστι φύσει θερμόν, τὰ
 10 δὲ θερμὰ καὶ ξηραίνει καὶ σκληρύνει, πρὸς δὲ τοὺς
 κόπους ἀξύμφορόν ἐστιν ἡ ξηρασία καὶ ἡ σκλη-
 ρότης· μετὰ δὲ τοῦ ὕδατος ἀνατριφθὲν ἦττον
 ξηραίνει.

Διὰ τί τοῖς κοπιῶσι προστάττουσιν ἐμεῖν, εἴπερ
 ὁ ἔμετος κοπῶδὲς ἐστιν; ἢ κόπος γίνεται ὀστών
 θλωμένων καὶ πιεζομένων καὶ κοπιωμένων, ταῦτα
 15 δὲ ὑπὸ τῶν ἐκτός τινος πάσχοι ἂν ἢ τῶν ἐν τῷ
 σώματι, καὶ τοῦτο διττῶς· ἢ γὰρ σαρκῶν ὑπερ-
 τεινουσῶν τὴν δύναμιν αὐτῶν, ἢ σώματος μι-
 χθέντος συχνοῦ τῷ ἄλλῳ σώματι, χώραν οἰκείαν

^a This is missing from the Greek text; the translation is supplied from Th. G.

PROBLEMS, V. 2-7

3 (There is evidence for this in the fact that when men
imitate those at a distance they speak shrilly.) And
does their bulk become less (because the blood passes
from the upper parts of the body to the lower)?^a

4 Why does only the abdomen become thin in those 3
who take violent exercise? Is it because there is
most fat about the abdomen?

5 Why is it that fat is wasted away with those who 4
take violent exercise? Is it because fat melts when
it is hot, and movement engenders heat, but flesh
does not melt?

6 Why are the parts about the stomach the fattest? 5
Is it because it is the part nearest the food? When-
ever the other parts draw sustenance from the
stomach, the stomach itself also draws it as well. Or
is it that the stomach takes the least exercise, because
it has no joints?

7 Why is weariness removed, when one mixes water 6
with oil and rubs oneself? Is it because the oil when
mixed with water penetrates farther? If oil is used
by itself, it does not penetrate to the same extent
because it remains on the surface. The body is there-
fore more softened when the oil penetrates, since oil
is naturally hot, and what is hot both dries and
hardens, but dryness and hardness are both useless
for weariness; but when it is rubbed in mixed with
water the drying effect of the oil is less.

Why do they order the tired to vomit, since vomit- 7
ing is in itself fatiguing? Does weariness occur when
the bones are bruised, crushed and wearied, and these
effects are due to external causes, or to causes within
the body, and that in two ways: either the flesh goes
beyond its own power, or a part of the body mixes in
large quantity with the rest, and does not keep its

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οὐκ ἔχοντος, οἷα τὰ περιττώματά ἐστιν. πάντα γὰρ
 τὰ ἐκτὸς ἡμῖν περιεπτόμενα βάρη κοπωδέστερα
 20 τῶν τοῦ σώματος μερῶν, κὰν τύχη σταθμῶ ὄντα
 αὐτῶν ἐλαφρότερα. σημεῖον δὲ τῶν εἰρημένων·
 οἱ γὰρ πλείον βεβρωκότες καὶ πεπωκότες, ἔλαττον
 πονήσαντες ἢ νήστευσι ὄντες, μάλλον κοπιῶσι διὰ
 τὸ μὴ τὴν οἰκείαν χώραν ἔχειν τὰ σιτία ὄντα
 ἄπεπτα. ἐπεὶ δὲ ὁ κόπος σύντηξιν ποιεῖ, ἢ δὲ
 25 σύντηξις περίττωμά ἐστιν, τοῦτό ἐστιν ὁ τὸν κόπον
 ἐν ἡμῖν ποιεῖ, πλανώμενον ἀτάκτως καὶ προσ-
 πῖπτον ὀστοῖς τε καὶ νεύροις καὶ τοῖς ἐντὸς τῆς
 σαρκὸς ἀραιοῖς οὔσι καὶ ἀνεωγμένοις. ὁ οὖν
 ἔμετος ἐξάγων αὐτὸ ὃν αἴτιον τοῦ κόπου, εἰκότως
 ἀκόπους ποιεῖ· λείπει γὰρ οἷον ἦν ἐν ἀρχῇ τοῦ
 30 πόνου τὸ σῶμα. κοπῶδες δ' ἐστὶν ὁ ἔμετος οὐ τῆ
 τῆς γινομένης ἐν αὐτῷ κινήσεως ὑπερβολῆ, ἀλλ'
 ὅταν συμβῇ μὴ καλῶς ἐξεμέσαι· λειφθέντων γὰρ
 πολλῶν σιτίων, καὶ περιττωμάτων τούτοις ἐνόητων,
 τὸν τοῦ ἐμέτου κόπον γίνεσθαι συμβαίνει, καθάπερ
 ἐπὶ τῶν πεπληρωμένων εἴρηται. εἰ οὖν μηδ'
 35 ἐκείνοις ὁ πόνος ἐστὶ τοῦ κόπου αἴτιος, ἀλλὰ τὸ
 οὔτως ἔχοντας πονῆσαι, οὐδ' ἂν τοῖς μὴ ἐξαιροῦσι
 τὰ σιτία ὁ ἔμετος εἴη τοῦ κόπου αἴτιος· χρῆν γὰρ
 πᾶσι τοῖς ἐμοῦσι γίνεσθαι κόπον, γίνονται δὲ
 ἀκοπώτεροι πολλοὶ ἐμέσαντες.

Διὰ τί κοπιαιώτερόν ἐστι τῷ βραχίονι τὸ διὰ
 881 b κενῆς ρίπτειν ἢ λιθάζοντα; ἢ ὅτι σπασματω-
 δέστερον τὸ διὰ κενῆς ἐστίν; οὐ γὰρ ἀπερείδεται

own proper place, as is the case with waste products? For weights that are attached to us from without are more exhausting than our own bodily parts, even if they are actually lighter in weight. Here is the evidence for this statement: those who have eaten and drunk considerably, even though they have used less exertion than if they were fasting, grow more weary because the food being undigested does not keep to its own proper place. But since fatigue causes liquefaction, and liquefaction is a waste product, it is this which causes fatigue in us, because it wanders about uncontrolled, and attacks the bones and the sinews, and the parts of the flesh within, which are rare and open. Consequently vomiting, by driving out the cause of the fatigue, naturally makes men less weary; for it leaves the body in the same condition as it was at the beginning of the trouble. Vomiting, however, is exhausting, not because of the excess of movement which takes place in it, but when it happens that it is incomplete; for when a quantity of food is left behind, and in it there are waste products, weariness arises from vomiting, as has been described in the case of those who are full of food. If, then, in their case the exertion is not the cause of the weariness, but the fact of them exerting themselves in this condition, then vomiting could not be the cause of weariness in those who do not expel all the food; for in that case weariness would occur with all those who vomit, but many become less weary after vomiting.

Why is it more exhausting for the arm to throw 8 with an empty hand than with a stone? Is it because to throw with an empty hand is a more convulsive movement? For it has no support upon anything,

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πρὸς οὐδέν, ὥσπερ ὁ βάλλων πρὸς τὸ ἐν τῇ χειρὶ βέλος. ὁμοίως δὲ τούτῳ καὶ ὁ πένταθλος πρὸς τοὺς ἀλτῆρας καὶ ὁ θέων παρασείων πρὸς τὰς
 5 χεῖρας. διὸ ὁ μὲν μεῖζον ἄλλεται ἔχων ἢ μὴ ἔχων ἀλτῆρας, ὁ δὲ θᾶπτον θεῖ παρασείων ἢ μὴ παρασείων.

Διὰ τί ἡ ταχυδρομία καὶ ἔπ' ἀνθρώπου καὶ ἐπὶ 9 τῶν ἄλλων ζώων νοσηματικούς ποιεῖ τὰ περὶ τὴν κεφαλὴν; καίτοι ὅλως ὁ δρόμος κατασπᾶν δοκεῖ
 10 κάτω τὰ περιττώματα, ὥσπερ ὁ περίπατος· διὸ καὶ παχύνονται τὰ σκέλη οἱ πολλὰ περιπατοῦντες, ὅτι εἰς τὰ κάτω ὑπονοστεῖ ἄνωθεν καὶ ἡ τροφή καὶ τὰ περιττώματα. ἢ ἡ μὲν κίνησις ταῦτό ποιεῖ, ἀλλ' ἢ ταχεῖα διὰ τὴν συντονίαν καὶ τὴν ἀπνευστίαν ἐκθερμαίνει τὴν κεφαλὴν, καὶ τὰς φλέβας ἐμφυσᾷ
 15 τὰς ἐν αὐτῇ, καὶ σπαστικὰς τῶν θύραθεν ποιεῖ δυνάμεων, οἷον ψύχους καὶ ἀλέας καὶ τῶν ἐκ τοῦ θώρακος, ὧν εἰσιόντων νοσεῖν ἀναγκαῖον τὸν τόπον ἐστίν.

Διὰ τί κοπιῶσι μὲν μάλλον ἐν τοῖς ὀμαλοῖς ἢ ἐν 10 τοῖς ἀνωμάλοις τόποις, θᾶπτον δὲ βαδίζουσιν τὴν ὀμαλὴν ὁδὸν ἢ τὴν ἀνώμαλον; ἢ ὅτι ἀκοπώτερον μὲν ἐστὶ τὸ μὴ αἰεὶ ἐν τῷ αὐτῷ σχήματι ποιεῖσθαι τὴν κίνησιν, ὃ συμβαίνει ἐν τῇ ἀνωμάλῳ πορείᾳ μάλλον; θᾶπτον γὰρ πορεύονται, ὅτι ἤττον παρὰ φύσιν κινουῦνται. ἐν μὲν οὖν τῷ ὀμαλῷ μικρὰ ἢ ἄρσις καὶ θέσις καὶ πυκνή ἐστίν, ἐν δὲ τῷ ἀνωμάλῳ
 25 τοῦναντίον. ἔστι δὲ τὸ αἶρειν παρὰ φύσιν· βία γάρ

unlike the thrower who has support against a missile in the hand. In just the same way the competitor in the pentathlon ^a has support against the *halteres*,^b and the runner by swinging his arms. For this reason the jumper jumps further when he has the *halteres* than when he has not, and the runner runs faster when he swings his arms than when he does not.

Why does rapid running produce headache both 9 with man and with other animals? And yet, generally speaking, running seems to draw down the waste products, just as walking does. This is why those who walk a great deal grow thick in the legs, because both the food and the waste products go down from above. Does movement produce the same result, but quick movement owing to the tension and the holding of the breath heats the head and distends the veins in it, making them liable to be affected by outside influences, such as cold and heat, and by the contents of the trunk, and when these enter, the region must become unhealthy?

Why do men grow more tired on level than on 10 uneven ground, and yet walk faster on level than on an uneven road? Is it because not making continuous movements exactly in the same position (which occurs more on an uneven road) is less tiring? Their quicker movement (on level ground) is because they are moving less unnaturally. On level ground the raising and lowering of the leg is slight but quickly repeated, whereas on uneven ground it is just the opposite. Now raising the leg is unnatural; for every

^a A competition of five events: jumping, running, discus-throwing, javelin-throwing and wrestling.

^b Stone weights held in the hand to assist the competitor in the long jump.

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ἔστι πᾶσα ἄρσις. τὸ δὲ παρ' ἐκάστην βάσιν γινόμενον μικρὸν πολὺ γίνεται παρὰ πολλάς.

Διὰ τί τὰ ἐπίπεδα κοπιαρώτερα ἐγκατακεῖσθαι 11
τῶν κοίλων ἐστίν; ἢ διὰ τὸ αὐτὸ καὶ τὰ κυρτὰ
30 τῶν ἐπιπέδων; ἐφ' ἓνα γὰρ τόπον συναθροιζόμενον τὸ βάρος ἐν τῇ καθέδρᾳ ἢ κατακλίσει τῇ
θλίψει ποιεῖ πόνον. τὸ μὲν οὖν κυρτὸν τοῦ εὐθέος,
τοῦτο δὲ τοῦ κοίλου μάλλον τοιοῦτόν ἐστι· τὸ γὰρ
σῶμα ἡμῶν ἐστὶ περιφερέστερον ἢ εὐθύτερον, τῶν
δὲ τοιούτων κατὰ πλεόν ἄπτεται τὰ κοῖλα ἢ τὰ
35 ἐπίπεδα. διὰ ταῦτα δὲ καὶ τὰ ἐνδιδόντα τῶν μὴ
ἐνδιδόντων ἀκοπώτερά ἐστι καὶ ἐγκατακλιθῆναι
καὶ ἐνέζεσθαι.

Διὰ τί οἱ βραχεῖς περίπατοι κοπώδεις εἰσίν; ἢ 12
ὅτι ἀνώμαλοί εἰσι; πολλάκις γὰρ ἴστασθαι ποιούσιν.
τὸ δ' ἐκ τοῦ ἐναντίου εἰς τοῦναντίον πυκνὰ
882 a μεταβάλλειν κοπῶδές ἐστιν· συνήθειαν γὰρ οὐδέ-
τερω ποιεῖ, ὃ ἐστὶν ἀκοπον. ἀμφοῖν δ' ἅμα οὐκ
ἐνδέχεται συνήθειαν γίνεσθαι.

Διὰ τί οἱ ἐπὶ τῶν ἵππων ὀχούμενοι, ὅσω ἂν 13
μάλλον θέῃ ὁ ἵππος, τοσοῦτω μάλλον δακρύουσι
5 τὰ ὄμματα; πότερον διὰ τὸ ψυχρότερον εἶναι τὸν
αἰεὶ προσπίπτοντα ἀέρα, ὅσω ἂν ἐλάττω χρόνον
ἄπτηται τοῦ σώματος, ὅπερ ἐπὶ τῶν γυμνῶν
θεόντων συμβαίνει; τὸ δὲ ψῦχος δάκρυον ποιεῖ.
ἢ διὰ τοῦναντίον; καὶ γὰρ τὸ θερμὸν ποιεῖ δα-
κρῦειν, οἷον ὁ ἥλιος· ἢ δὲ κίνησις θερμότητα ποιεῖ.
10 ἢ διὰ τὴν ὑπὸ τοῦ ἀέρος πληγὴν; ὡς γὰρ οἱ ἄνεμοι
ταράττουσιν οἱ ἐξ ἐναντίας τὰ ὄμματα, οὕτως ὁ
ἀήρ προσπίπτων, ὅσω ἂν θᾶπτον ἐλαύνῃ, τοσοῦτω
μάλλον ποιεῖ πληγὴν μαλακὴν.

PROBLEMS, V. 10-13

such raising involves muscular effort. And though the raising involved in each step is small in itself, yet it becomes considerable when repeated many times.

Why are level surfaces more tiring to lie down upon 11 than hollow ones? Is it for the same reason which makes a convex surface more tiring than a level one? For when all the weight is collected into one place, either in sitting or in lying, discomfort is caused by pressure. The convex produces this result more than the flat, and the flat more than the concave; for our body is more curved than straight, and the concave surface therefore touches it at more points than the flat. For this reason surfaces which yield to pressure are less exhausting than those which do not, both to lie on and to sit on.

Why are short walks exhausting? Is it because 12 they are uneven? For they involve standing still frequently. Now to change frequently from one position to a contrary one is exhausting; for it allows neither position to become habitual, and habit is not tiring. It is impossible to become habituated to both positions at the same time.

Why do the eyes of riders on horseback fill with 13 tears more, the more the horse gallops? Is it because the air which strikes the rider successively is colder, according as it touches the body for a shorter time, as also happens with naked runners? But cold produces tears. Or is it the other way round? For heat also produces tears, for instance the sun does; and movement produces heat. Or is it due to the impact of the air? For as the winds from an opposite direction disturb the eyes, so the air, the faster one rides, strikes one all the more with a soft blow.

Διὰ τί τὰ μὲν ἄλλα τριβόμενα σαρκοῦνται μέρη, 14
 ἢ δὲ γαστήρ λεπτοτέρα γίνεται; ἢ οὐδὲ αὐτὴ ἐκ
 15 προσαγωγῆς, ἀλλὰ στιφροτέρα; οὐ μὲν ἄλλ' οὐχ
 ὁμοίως γε καὶ ἡ σὰρξ, διὸ καὶ τὸ πρόβλημά ἐστιν.
 ὅλως γὰρ ἐν τοῖς γυμνασίοις καὶ πόνοις μάλιστα
 λεπτύνεται ἡ γαστήρ. αἴτιον δ' ὅτι τὰ πίονα θερ-
 μαινόμενα τήκεται, καὶ τὰ φύσει τάσιν ἔχοντα
 μᾶλλον. τὸ δὲ δέρμα ἐστὶ φύσει ἔχον τάσιν· ἀλλὰ
 20 διὰ τὸ πιαίνεσθαι τάχιστα αἰεὶ τινα ἔχει πύοτητα,
 εἴαν μὴ κάμνη τινὰ νόσον. αἴτιον δὲ τούτου ὅτι
 ἐγγύς ἐστιν τῆς τροφῆς. ἐπεὶ οὖν ὅλως ἡ πιμελή
 οὐκ ἐστὶν φύσει, ἀλλ' ἐπίκτητον, καὶ οὐ τῶν ἀναγ-
 καίων μερῶν ὡσπερ ἡ σὰρξ, καὶ ἡ τῶν γυμνασίων
 κινήσεις καὶ ἡ τῆς τρίψεως θερμαίνουσαι τήκουσιν
 25 αὐτὴν καὶ τὴν τροφήν ἐκπλεονάζουσαν νέμουσιν
 τοῖς ἄλλοις μορίοις. διὸ αἱ μὲν καθέδραι τὴν
 κοιλίαν πιαίνουσι, τὸ δ' ἄλλο σῶμα λεπτύνουσι,
 αἱ δὲ κινήσεις καὶ αἱ τρίψεις τὴν μὲν κοιλίαν
 λεπτύνουσι, τὸ δ' ἄλλο σῶμα παχύνουσι.

Διὰ τί ἐκ τῶν μακρῶν καὶ σφοδρῶν ὁδῶν καὶ 15
 30 δρόμων, ὅταν στή τις ἐπ' ἄκρων τῶν δακτύλων,
 σείονται τῶν ποδῶν αἱ πτέρναι καὶ σπῶνται¹ κάτω
 προπετῶς; ἢ διὰ τὴν συνέχειαν καὶ σφοδρότητα
 τῆς κινήσεως οὐκ ἀναπαύεται ὁ σεισμὸς τῷ ἀν-
 θρώπῳ τῶν νεύρων; τοῦ μὲν γὰρ ὅλου σώματος
 κρατεῖ ἡ ψυχὴ πολλάκις, μορίων δ' οὐ, ὅποταν πως
 35 κινηθῇ, οἷον καὶ καρδίας καὶ αἰδοίου. αἴτιον δ'
 ὅτι πνεῦμα πολὺ περὶ τὰ νεῦρα ἐκκαίεται, ὃ
 οὐχ ἅμα ἐκψύχεται σπάντι. τοῦτο οὖν σείον
 ὡσπερ ὑποσπῶν τῇ κινήσει κατασπᾶται καὶ
 τοῦ πορρωτάτῳ ἤκιστα ποιεῖ κρατεῖν· τοιοῦτον

¹ σπῶνται Forster : σπᾶται Ruelle.

PROBLEMS, V. 14-15

Why do other parts of the body become more fleshy 14 by massage, but the stomach becomes thinner? Or does not the stomach become gradually thinner, but only more solid? But in any case the same thing is not true of the flesh, and hence the problem arises. Generally speaking, in athletic exercise and in all exertion the stomach becomes thin. The reason is, that fat parts, and those parts which naturally expand more, liquefy when heated. Now the skin naturally expands; but because it grows fat very easily, it always contains some fat, unless the subject is suffering from disease. The reason of this is that it is near the food. Since then the fat is not, generally speaking, natural, but is an addition, and is not, like the flesh, one of the necessary parts, and the movement of athletic exercise and massage heats and melts it, and distributes the superfluous nourishment to the other parts of the body, so sitting down makes the stomach fat, but the rest of the body thin, but movement and massage thins the stomach, but thickens the rest of the body.

Why is it that after long and violent walking and 15 running, when one stands on the tip of the toes, the heels tremble and are quickly put down? Is it because, owing to the continuous violent movement, the quivering of the man's sinews has no rest? For the soul frequently controls the whole body, but not parts of it, when they have been moved in some way, such as the heart and the pudenda. The reason is, that much breath is heated about the sinews, which does not cool at the moment when the man stands still. This breath, therefore, is drawn down, making him shake, as though it dragged on him from below by its movement, and makes him quite unable to

882 a δὲ αἰ πτέρναι, οἷον τοῖς ὀργιζομένοις τὸ κάτω χεῖλος.

882 b Διὰ τί οἱ μὴ σφόδρα συντόνως τρέχοντες ἐν τῷ 16
 ῥυθμῷ ἀναπνέουσιν; πότερον ὅτι πᾶς ῥυθμὸς
 ὠρισμένη μετρεῖται κινήσει, τοιαύτη δ' ἐστὶν ἢ δι'
 ἴσου οὔσα, ὅπερ οἱ τροχάζοντες ποιοῦσιν; ἅμα
 5 οὖν ἀρχόμενοι τροχάζειν ἀναπνέουσιν, ὥστε τὴν
 ἀναπνοὴν δι' ἴσου γινομένην, διὰ τὸ τῇ ἴσῃ κινήσει
 μετρεῖσθαι, ῥυθμὸν ποιεῖν. ἢ ὅτι πᾶσα μὲν
 ἀπλῶς ἀναπνοὴ δι' ἴσου γίνεται τοῖς κατὰ φύσιν
 αὐτῇ χρωμένοις καὶ μὴ κατέχουσιν; καθημένοις
 μὲν οὖν καὶ βαδίζουσι μετρίας οὔσης τῆς τοῦ σώ-
 10 ματος κινήσεως, οὐκ εὐδηλος ὁ ῥυθμὸς γίνεται·
 συντόνως δὲ τρέχουσιν, οὐ παρακολουθούσης τῇ
 κινήσει τῆς αἰσθήσεως, οὐ δυνάμεθα συνορᾶν τὸν
 τῆς ἀναπνοῆς ῥυθμόν. ἐν δὲ τῷ μετρίως τροχάζειν
 μέτρον ἢ κίνησις αἰσθητὸν τῆς ἀναπνοῆς ποιοῦσα
 τὸν ῥυθμὸν δηλοῖ.

Διὰ τί ἐν τῷ τροχάζειν ἐκπνευματοῦσθαι δοκεῖ 17
 15 ἡμῖν ὁ ἀήρ; πότερον ὅτι κινούμενοι διὰ τοῦ τρο-
 χάζειν τὸν συνεχῆ τοῖς σώμασιν ἡμῶν ἀέρα κινου-
 μεν, ὃ ἐστὶ πνεῦμα; διόπερ οὐ δοκεῖ μόνον, ἀλλὰ
 καὶ κατ' ἀλήθειαν ἐκπνευματοῦται ὁ ἀήρ· ἢ διότι
 τροχάζοντες προσκόπτομεν τῷ ἀέρι, τούτου δὲ
 20 συμβαίνοντος μᾶλλον αἰσθησιν λαμβάνομεν τοῦ
 ἀέρος διὰ τῆς κινήσεως; εἰκότως οὖν ἡμῖν ἐκ-
 πνευματοῦσθαι δοκεῖ· τοῦτο γὰρ συμβαίνει διὰ τὴν
 φοράν.

Διὰ τί μᾶλλον θέοντες ἢ βαδίζοντες πίπτουσιν; 18
 <ἢ> ὅτι μᾶλλον πρὶν κινεῖσθαι αἴρουσιν; τὸ γὰρ
 θέειν τοῦ βαδίζειν τούτῳ διαφέρει.

25 Διὰ τί ποτε ἀναβαίνοντες μὲν τὰ γόνατα πονοῦ- 19

control his extremities—in this case his heels. The same thing is true of the lower lip in the angry.

Why do those who are not running under great strain breathe regularly? Is it because all rhythm is measured by definite movement and the kind of movement made by runners is regular? As soon as they begin to run, they breathe in such a way that their breathing has a regular motion, and, because it is measured by regular movement, it produces a rhythm. Is this due to the fact that all breathing without exception is a regular movement with those who employ it naturally and do not check it? So in sitting and walking, as the movement of the body is moderate, the rhythm is not obvious; but when men run under strain, as our perception cannot follow the movement, we cannot comprehend the rhythm of the breathing. But in running at a moderate pace the movement makes the time of breathing perceptible, and shows its rhythm.

Why does the air in running seem to vaporize? Is it because when we move in running we move the air which is continuous with our bodies, and this is breath? Consequently it is not merely an appearance, but the air actually is vaporized. Or is it because when running we strike the air, and when this happens we are more conscious of the air because of the movement? And so it naturally seems to vaporize; this is due to the movement.

Why are men more apt to fall when they run than when they walk? Is it because they raise their feet more before movement? For this is the difference between running and walking.

Why do we feel pain in our knees when we go

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μεν, καταβαίνοντες δὲ τοὺς μηρούς; ἢ ὅτι ὅταν
 μὲν ἀναβαίνωμεν, ἀναρριπτοῦμεν ἄνω τὸ σῶμα,
 καὶ ἢ σπᾶσις πολλὴ τοῦ σώματος καὶ [ἢ] ἀπὸ τῶν
 γονάτων γίνεται, διὸ πονοῦμεν τὰ γόνατα· ἐν δὲ
 80 τοῖς κατάντεσι, διὰ τὸ ὑποφέρεσθαι τοῖς σκέλεσι,
 τοῖς μηροῖς ἀποστηριζόμενοι πονοῦμεν αὐτούς;
 εἴθ' ἅπαν τὸ παρὰ φύσιν γινόμενον πόνον καὶ
 λύπην παρασκευάζει. ἔστι δὲ τὸ κατὰ φύσιν τοῖς
 μὲν γόνασιν ἢ εἰς τὸ πρόσθεν κλάσις, τοῖς δὲ
 μηροῖς ἢ εἰς τοῦπισθεν. ἐν μὲν οὖν τοῖς ἀνάντεσι
 85 τὰ γόνατα κλᾶται εἰς τοῦπισθεν διὰ τὸ ἀποστηρί-
 ζεσθαι βούλεσθαι, ἐν τοῖς κατάντεσι δ' οἱ μηροὶ εἰς
 τοῦμπροσθεν κλῶνται διὰ τὸ προπετὲς ἡμῶν εἶναι
 τὸ σῶμα.

Διὰ τί ποτε ἐν ταῖς ὁδοῖς τῶν μηρῶν τὸ μέσον 20
 μάλιστα πονοῦμεν; ἢ ὅτι παντὸς μακροῦ καὶ ἐνὸς
 ὄντος, ἐστηριγμένου δέ, τοῦ μέσου ὁ πόνος μάλιστα
 883 a γίνεται; διὸ καὶ κατάγνυται μάλιστα ἐντεῦθεν.
 ὁ δὲ μηρός ἐστι τοιοῦτον· διὸ καὶ τὸ μέσον αὐτοῦ
 μάλιστα πονοῦμεν.

Διὰ τί οἱ ὑγροὶ ταχὺ πνίγονται πονήσαντες καὶ 21
 ὑπὸ τοῦ καύματος; ἢ ὅτι ἐκθερμαινόμενον τὸ
 ε ὑγρὸν ἀήρ γίνεται, καὶ κάει μᾶλλον τὸ πλεόν;
 ὅταν οὖν μὴ δύνηται ὑπεξάγειν διὰ τὸ πλῆθος, οὐ
 γίνεται κατάψυξις, ὥστε ταχὺ ἐκπυροῦται ὑπὸ τοῦ
 συμφύτου καὶ ἐπικτήτου θερμοῦ. διὸ καὶ οἱ γινό-
 μενοι ἰδρῶτες τοῖς γυμναζομένοις καὶ ὅλως τοῖς
 πονοῦσιν καὶ ἢ τοῦ πνεύματος ἕξοδος ὠφέλιμον·
 10 διακρινομένου γὰρ καὶ λεπτυνομένου τοῦ ὑγροῦ
 πνεῦμα γίνεται.

Διὰ τί τὰ σύμμετρα τῶν σωμάτων κάμνει τε 22
 πολλάκις καὶ ἀπαλλάττει ῥᾶον; ἢ διὰ ταῦτό

uphill, but in our thighs when we come down? Is it because when we go uphill we throw our bodies forward, and the contraction of the body is great and comes from the knees, and so we feel pain in the knees; but in going downhill our legs are beneath us, and as we are supported by our thighs we feel pain in them? Moreover, every movement which is unnatural produces pain and distress. Now the bending of the knees in a forward direction is natural, but the opposite direction is natural to the thighs. So in going uphill the knees are bent backwards because we need support, and in going downhill the thighs are bent forwards because our body is thrown forwards.

Why is it that on journeys we feel most strain in 20 the middle of the thigh? Is it because in anything which is long, continuous and fixed the strain falls upon the middle? For this reason it is most likely to break at this point. Now this is the nature of the thigh; so that we feel most strain in the centre of it.

Why do the moist choke most easily under the 21 influence of either exertion or heat? Is it because their moisture when heated becomes air and the more there is of it the hotter it gets? When it is impossible to draw it off because of its quantity, no cooling takes place, so that the patient is soon burned up by the combination of the natural and acquired heat. For this reason the sweat which comes to those who take exercise and generally to those who exert themselves, and the expulsion of breath are advantageous; for when the moisture is separated and rarefied, breath is formed.

Why do well-proportioned bodies often feel fatigue 22 and also throw it off more easily? Is the cause the

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ἄμφω; ὀμαλὸν γὰρ τὸ σύμμετρον, τὸ δὲ ὀμαλὸν
 ὀμοπαθέστερον· εἰν οὖν τι πονήσῃ μέρος, εὐθὺς
 15 συμπονεῖ τὸ ὄλον. τὸ δὲ ἀσύμμετρον, ἅτε μᾶλλον
 ἀπηρτημένον, οὐ συναπολαύει τῶν μερῶν. κάμνει
 μὲν οὖν πολλάκις διὰ τοῦτο, ῥᾶον δὲ ἀπαλλάττει,
 ὅτι πᾶν κοινωνεῖ τὸ σῶμα· εἰς πλείω γὰρ διανεμό-
 μενον τὸ πάθος γίνεται ἀσθενέστερον, ὥστε εὐαπ-
 αλλακτότερον. τὸ δὲ ἀσύμμετρον, ἅτε οὐ κοινωνοῦν
 20 τοῖς μέρεσιν, ἐλαττονάκις μὲν κάμνει, χαλεπώτερον
 δὲ ἀπαλλάττει· σφοδρὸν γὰρ τὸ πάθος.

Διὰ τί κοπιῶσι μὲν μᾶλλον ἐν τοῖς ὀμαλοῖς ἢ ἐν 23
 τοῖς ἀνωμάλοις, θᾶπτον δὲ βαδίζουσιν τὴν ὀμαλήν
 ἢ τὴν ἀνώμαλον; ἢ ὅτι ἀκοπώτατον μὲν τὸ μὴ αἰεὶ
 25 * * * ἐν τῇ ἀνωμάλῳ πορεία μᾶλλον, θᾶπτον δὲ
 πορεύονται, ὅπου ἐν τῷ ἴσῳ χρόνῳ ἐλάττων ἢ
 ἀναφορά. ἐν μὲν οὖν τῷ ὀμαλεῖ μικρὰ ἢ ἄρσις
 καὶ πυκνή, ἐν δὲ τῷ ἀνωμάλῳ τοῦναντίον. τὸ δὲ
 παρ' ἐκάστην βάσιν γινόμενον πολὺ γίνεται παρὰ
 πολλάς.

Διὰ τί καταβαίνοντες μὲν τὰ κατάντη τοὺς 24
 30 μηροὺς μάλιστα πονοῦμεν, ἀναβαίνοντες δὲ τὰς
 κνήμας; ἢ ὅτι ἀναβαίνοντες μὲν τῷ αἴρειν τὸ
 σῶμα; ἅπαν γὰρ γίνεται φορτίον τὸ σῶμα. ὦ
 οὖν ἅπαν ἐπίκειται καὶ ὦ αἴρομεν, τοῦτο μάλιστα
 πονεῖ. ἢ δὲ κνήμη τοῦτο. ἔσχατον γάρ, μῆκος
 ἔχον, καὶ οὐχ ὥσπερ ὁ πούς πλάτος ἔχει· διὸ
 35 σαλεύεται. ὥστε οἶον τῷ ὤμῳ τὰ βάρη κινουῦμεν,
 καὶ ἐπὶ τούτῳ ἔχομεν. τοιγαροῦν καὶ πονοῦμεν

^a The evident lacuna here may be restored from Problem 10.

same in both cases? For the well-proportioned is uniform, and the uniform is more sympathetically affected. If, therefore, any part is suffering, the whole immediately suffers with it. But the ill-proportioned, being more disunited, does not act sympathetically with its parts. The former, then, for this reason frequently grows weary but throws it off more easily, because the whole body shares it; for, as the trouble is distributed to more parts, it is weaker and hence more easily thrown off. But the ill-proportioned, as it does not share with the parts, grows weary less often, but has greater difficulty in throwing off the fatigue; for the trouble is violent.

Why do men grow more weary on level than on uneven ground, and yet walk faster on level than on uneven ground? Is it because it is less tiring (not to make the same movement continually in the same position, which occurs) ^a more in walking on uneven ground? But men travel more quickly, when there is less raising of the foot in equal time. On the level the raising of the foot is slight and often repeated, and on uneven ground just the opposite. The movement which takes place at each step becomes considerable because it is often repeated.

Why when we go downhill do we suffer most in the thighs, and going uphill in the legs? Is it because when we go uphill we have to raise the body? For the whole body becomes a burden to be carried. So that upon which the body rests and by which we raise it naturally suffers most. And this is the leg. It is an extremity which is long, and has not breadth like the foot; hence it sustains the shock. Just in the same way we carry weights on the shoulder and we rest them on it; hence we feel most pain in the

ARISTOTLE

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τὸν ὤμον μάλιστα. καταβαίνοντες δὲ τῷ ἐμ-
πίπτειν τὸ σῶμα κάτω καὶ προωθεῖν παρὰ φύσιν
ὁ πόνος ἐστίν, ὥστε ὧ μάλιστα ἐπιπίπτει καὶ
σαλεύει, τοῦτο παρέχει τὸν πόνον. ἢ μὲν οὖν
40 κνήμη μένει, τὸ δὲ βάρος ὁ θώραξ γίνεται· ὁ δὲ
883 b μηρὸς δέχεταιί τε καὶ σαλεύεται διὰ τὸ μῆκός τε
ἔχειν καὶ στρέφεσθαι ἄνωθεν, ἢ ὁ θώραξ ἐπιπίπτει.

Διὰ τί πλείων δοκεῖ ἢ ὁδὸς εἶναι, ὅταν μὴ εἰδότες 25
βαδίζωμεν πόση τις, ἢ ὅταν εἰδότες, εἰς τὰλλα
5 ὁμοίως ἔχοντες τύχωμεν; ἢ ὅτι τὸ εἰδέναί ποση
τὸ εἰδέναί ἐστὶ τὸν ἀριθμὸν αὐτοῦ· καὶ πλείον ἀεὶ
τὸ ἀόριστον τοῦ ὠρισμένου; ὥσπερ οὖν εἰ ἤδει
ὅτι τοσήδε, πεπερασμένην ἀνάγκη εἶναι, οὕτω καὶ
εἰ μὴ οἶδεν, ὡς ἀντιστρέφοντος παραλογίζεται ἢ
ψυχῇ, καὶ φαίνεται εἶναι ἄπειρος. ἔτι τὸ ποσὸν
10 ὠρισμένον καὶ τὸ ὠρισμένον ποσόν. ὅταν τοίνυν
μὴ φαίνεται ὠρισμένον, ὥσπερ ἄπειρον φαίνεται
εἶναι, διὰ τὸ τὸ πεφυκὸς ὠρίσθαι, εἰ μὴ ἢ ὠρι-
σμένον, ἄπειρον εἶναι, ὥστε καὶ τὸ φαινόμενον μὴ
ὠρίσθαι φαίνεσθαι ἀνάγκη πως ἀπέραντον.

Διὰ τί τοὺς μηροὺς μᾶλλον ἢ τὰς κνήμας κο- 26
15 πιῶσιν; πότερον ὅτι ἐγγὺς τοῦ τόπου τοῦ ἔχοντος
τὸ περίπτωμα, ὥστε ἂν ὑπερβάλλῃ διὰ τὴν κίνησιν
τῇ θερμότητι, συσπῶσιν οἱ μηροὶ μᾶλλον καὶ
πλείον ἢ αἱ κνήμαι; ἢ διὰ τὸ συμφυεῖς¹ εἶναι μᾶλλον
τοὺς μηρούς; μάλιστα γὰρ πονοῦσιν τῇ τοῦ συν-
εχοῦς διαστάσει. καὶ γὰρ ἂν μηδὲν ἔχοντες περίπ-
20 τωμα κοπιάσωσιν, ὅμως τοὺς μηροὺς καὶ τὴν

¹ συμφυεῖς Forster : συμφυές Ruelle.

shoulder. But, in going downhill, because the body falls downwards and thrusts us forward, the strain is unnatural, so that what feels the pain is the point where the body falls forward and shakes most. The leg, therefore, stays still, and the trunk becomes the weight; but the thigh takes the weight and is shaken, because it is long and bent from above, where the weight of the trunk presses it.

Why does the journey seem to be longer, when we 25 walk without knowing how long it is than when we know, if other conditions are the same? Is it because to know how long it is, is to know the number involved; and the indeterminate is always more than the determinate? If, then, a man knew that it was so long, it must be limited, so conversely if he does not know its length, as though the proposition could be reversed, the mind reasons incorrectly and the journey seems to be unlimited. Again, a quantity is limited and that which is limited is a quantity. When, then, anything does not appear to be limited, it appears to be unlimited, because that which is of a nature to be limited, if it is not limited, is infinite; hence that which appears not to be limited must necessarily appear in a sense unlimited.

Why do we get more weary in the thighs than in 26 the calf of the leg? Is it because the former is near to the part containing the waste product, so that if it becomes excessive owing to the heat due to movement, the thighs contract more readily and to a greater extent than the calves? Or is it because the thighs have a closer connexion with each other? They therefore suffer more through the separation of their continuity. For, if men grow weary even when their body contains no waste product, yet they suffer more

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ὄσφυν πονοῦσι μᾶλλον. ἢ ὅτι καθάπερ οἱ βου-
βῶνες γίνονται πληγέντες διὰ τὴν συνάρτησιν τῶν
φλεβῶν καὶ νεύρων, οὕτω καὶ οὗτος; ἐγγυτέρω
δὲ τῆς ἀρχῆς ὁ μηρός. ἢ διότι μᾶλλον ἐν τῷ αὐτῷ
σχήματι ὁ μηρὸς τῆς κνήμης; τοῦτο δὲ κοπιαρῶ-
25 τερον. ἢ ὅτι σαρκώδης, ὥστε πολὺ τὸ κατὰ φύσιν
ἔχον ἐν αὐτοῖς;

Διὰ τί ἐνίοις, ὅταν πονήσωσιν, ἔλκη ἐκφύουσιν; 27
ἢ ὅταν τὸ σῶμα ἀκάθαρτον ᾖ, ἢ κίνησις θερμαί-
νουσα καὶ ἄλλα περιττώματα συνεξικμάζει μετὰ
τοῦ ἰδρώτος; παχέα δὲ ὄντα καὶ χυμοὺς ἔχοντα
30 μοχθηροῦς, ὀξεῖς καὶ πικροῦς καὶ ἀλμυροῦς, τὰ
περιττώματα ἐκκρίνεσθαι μὲν οὐ δύναται διὰ πάχος,
ἐξαίρεται δὲ διὰ τῆς σαρκὸς καὶ ἐξελκοῖ διὰ πι-
κρότητα τοῦ χυμοῦ.

Διὰ τί τοῖς ἐκ τῶν γυμνασίων καὶ φαρμακοποσιῶν 28
οὐκ εὐθὺς προσφέρουσι τροφήν; ἢ διότι καθαίρεται
35 τὸ σῶμα ἔτι, καὶ οὐκ ἀναπέπαυται πονοῦν, καὶ
ἀποκέκριται τὰ περιττώματα;

Διὰ τί χαλεπώτερον θεῖν ἢ βαδίζειν; ἢ ὅτι 29
πλείον φορτίον φέρει ὁ θέων; ὅταν γὰρ ᾖ μετέωρος,
ἅπαν ἐφ' ἑαυτῷ ἔχει. ὁ δὲ βαδίζων, οἷον οἱ ἐπὶ
40 τοῖς τειχίοις ἀναπαυόμενοι, ἐπιθεῖς ἔχει ἐπὶ τῷ
ἡρεμοῦντι.

884 a Διὰ τί ἐκ τῶν γυμνασίων οὐ πεινώσιν εὐθύς; 30
πότερον διὰ τὴν ὑπόλειψιν τῆς συντήξεως, ἕως
ἂν τι πεφθῇ;¹ ἢ διὰ τὸ πνεῦμα ὃ ποιεῖ ὁ πόνος
ἐκ τοῦ ὑγροῦ; ἢ διὰ τὴν δίψαν ἢ γίνεται ἐκ τοῦ
5 θερμαίνεσθαι πονοῦντας; πάντα γὰρ συμβαίνει
ταῦτα.

¹ ἂν τι πεφθῇ Bussemaker: ἀντιπεφθῇ Ruelle.

in the thighs and the loin. Or is it because, just as the groin swells when struck owing to the close connexion of nerves and sinews, so also does the thigh? For the thigh is nearer to the source. Or is it because the thigh remains more in the same position than the leg? And this is more tiring. Or is it because it is fleshy, so that there is more natural heat ^a in it?

Why do some men develop sores when they exert ²⁷ themselves? Is it that when the body is impure, movement produces heat, and causes other waste products to exude with the sweat? These waste products, because they are thick and contain unpleasant humours, sharp, bitter and salt, cannot be separated out because of their thickness, but swell up through the flesh and produce sores because of the bitterness of the humour.

Why is not food administered immediately after ²⁸ exercise and the taking of medicine? Is it because the body is still being cleansed, and has not yet ceased its exertion, and the waste products are still being expelled.

Why is it more difficult to run than to walk? Is ²⁹ it because the runner carries a heavier burden? For when he steps high, he carries the whole burden himself. But the walker carries the burden on the part which is resting, as if he were leaning against a wall.

Why are not men hungry immediately after violent ³⁰ exercise? Is it because liquefaction still remains until concoction is complete? Or is it due to the breath, which the exertion engenders from the liquid? Or is it due to the thirst which is the result of heat due to exertion? All these factors are present.

^a Some word must be supplied here and "heat" seems the most probable.

Διὰ τί ἐξονειρωκτικοί εἰσιν οἱ κοπιῶντες καὶ 31
 φθισιῶντες; ἢ ὅτι ὅλως ἐξονειρωκτικοὶ οἱ θερμοὶ
 καὶ ὑγροί; τὸ γὰρ σπέρμα τοιοῦτόν ἐστι τὴν
 φύσιν. τὸ τοιοῦτο δὲ ἐξ οὕτω διακειμένων μάλιστα
 10 γίνεται, ὅταν ἢ ἀπὸ τοῦ ὕπνου θερμότης προσ-
 γένηται· μικρᾶς γὰρ ῥοπῆς τὰ σώματα δεῖται, καὶ
 ταύτης ἔσωθεν, ἀλλ' οὐκ ἔξωθεν. οἱ δὲ φθισικοὶ
 καὶ κοπιῶντες οὕτω διάκεινται· οἱ μὲν γὰρ κο-
 πιῶντες διὰ τὸν κόπον καὶ τὴν κίνησιν συντήγματος
 θερμοῦ πλήρεις εἰσίν, οἱ δὲ φθισικοὶ διὰ τὸν κατάρ-
 15 ρουν καὶ τὴν γινομένην θερμὴν ὑπὸ τῆς φλεγμασίας.

Διὰ τί τὸ ἀριστερὸν σκέλος χαλεπώτερον τρί- 32
 βεσθαι ὑφ' ἑαυτοῦ πολὺν χρόνον ἢ τὸ δεξιόν; ἢ
 ὅτι τοῖς δεξιοῖς πονεῖν δυνάμεθα; ἐν τοῖς δὲ παρὰ
 φύσιν ἢ τοῦ ἀριστεροῦ σκέλους τρίψις ἐξεστραμ-
 20 μένως γίνεται, τὰ δὲ παρὰ φύσιν ποιούμενα
 χαλεπά. τῇ δὲ ἀριστερᾷ τὰ δεξιὰ οὐθὲν ἐπίδηλον
 διὰ τὸ μηθετέρως ἰσχύειν.

Διὰ τί ὑγιεινὸν τὸ τροφῆς μὲν ὑποστέλλεσθαι, 33
 πονεῖν δὲ πλείω; ἢ ὅτι τοῦ νοσεῖν αἴτιον περιτ-
 τώματος πλήθος; τοῦτο δὲ γίνεται ἢ διὰ τροφῆς
 25 ὑπερβολὴν ἢ διὰ πόνων ἔνδειαν.

Διὰ τί οὐ δεῖ πυκνοῦν τὴν σάρκα πρὸς ὑγίειαν, 34
 ἀλλ' ἀραιοῦν; ὡσπερ γὰρ πόλις ὑγιεινὴ καὶ τόπος
 εὐπνους (διὸ καὶ ἡ θάλαττα ὑγιεινὴ), οὕτω καὶ
 σῶμα τὸ εὐπνουν μᾶλλον ὑγιεινόν. δεῖ γὰρ ἢ μὴ
 30 ὑπάρχειν μηθὲν περίττωμα, ἢ τούτου ὡς τάχιστα
 ἀπαλλάττεσθαι· καὶ δεῖ οὕτως ἔχειν τὰ σώματα

^a Evidently "with the right hand."

PROBLEMS, V. 31-34

Why is semen more likely to be emitted in sleep 31 by the tired and by the consumptive? Is it because, speaking generally, it is those who are warm and moist who emit semen? For this is the nature of semen. Thus this most often occurs with men in this condition, when the warmth due to sleep is added; for in these circumstances the body needs but a slight impulse, and this comes from inside, not from outside. Now this is the condition of the tired and the consumptive, for the tired are full of warm liquefaction due to weariness and movement, and the consumptive are in the same condition owing to the flux and to the warmth caused by inflammation.

Why is it more difficult for a man to rub his left leg 32 for a long time than his right? ^a Is it because, although we can take more exertion with the right side, the rubbing of the left leg, involving as it does a twisted movement, is an unnatural action, and unnatural actions are always difficult? In rubbing the right side with the left hand the difference is less obvious, because the left hand is not strong enough when applied to either side.

Why is a reduction of food and an increase of ex- 33 ercise healthy? Is it because excess of waste product is a cause of disease? Now waste product is due either to excess of food, or to shortage of exercise.

Why should the flesh not be densified but rarefied 34 with a view to health? For just as a city or a place is healthy if it is well ventilated (this is why the sea is healthy), so also the well-ventilated body is healthy. For either there should be no waste product, or this should be removed as quickly as possible; the body should therefore be in such a condition that on receiv-

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ὥστε λαμβάνοντα εὐθὺς ἐκκρίνειν τὴν περίττωσιν,
καὶ εἶναι ἐν κινήσει καὶ μὴ ἡρεμείν. τὸ μὲν γὰρ
μένον σήπεται, ὥσπερ ὕδωρ, τὸ δὲ σηπόμενον καὶ
μὴ κινούμενον νοσοποιεῖ. τὸ δ' ἐκκρινόμενον πρὸ
35 τοῦ διαφθαρῆναι χωρίζεται. τοῦτ' οὖν πυκνουμένης
μὲν τῆς σαρκὸς οὐ γίνεται (ὥσπερ εἰ γὰρ ἐμφράτ-
τονται οἱ πόροι), ἀραιουμένης δὲ συμβαίνει. διὸ
καὶ οὐ δεῖ ἐν τῷ ἡλίῳ γυμνὸν βαδίσειν· συνίσταται
γὰρ ἡ σὰρξ, καὶ κομιδῇ ἀποσαρκοῦνται, καὶ ὑγρό-
τερον τὸ σῶμα γίνεται. τὸ μὲν γὰρ ἐντὸς δὴ μένει,
884 b τὸ δ' ἐπιπολῆς ἀπαλλάττεται, ὥσπερ καὶ τὰ κρέα
τὰ ὀπτὰ τῶν ἐφθῶν¹ μᾶλλον. οὐδὲ τὰ στήθη γυμνὰ
ἔχοντα βαδίσειν· ἀπὸ γὰρ τῶν ἄριστα ὠκοδομη-
μένων ὁ ἥλιος ἀφαιρεῖ ὃ ἡκιστα δεῖται ἀφαιρέσεως,
5 ἀλλὰ μᾶλλον τὰ ἐντός. ἐκεῖθεν μὲν οὖν διὰ τὸ πόρρω
εἶναι, ἂν μὴ μετὰ πόνου, οὐκ ἔστιν ἰδρῶτ' ἀναγα-
γεῖν, ἀπὸ τούτου δὲ διὰ τὸ πρόχειρον εἶναι ῥάδιον.

Διὰ τί κοπῶδεις οἱ βραχεῖς τῶν περιπάτων; ἢ 35
ὅτι πολλάκις συνίστανται καὶ οὐχ ὁμαλῶς κινουῦνται
10 περὶ τὰς καμπάς; τὸ δὲ τοιοῦτον κοπῶδες.

Διὰ τί ἐστηκότες ἐν τῷ ἡλίῳ μᾶλλον θερμαίνονται 36
ἢ κινούμενοι, καὶ ταῦτα τῆς κινήσεως θερμαντικῆς
οὔσης; ἢ οὐ πᾶσα κίνησις θερμαίνει, ἀλλ' ἐνία
ψύχει, οἷον καὶ ἐπὶ τῶν τὰς χύτρας τὰς ἐψημένας
15 φυσώντων καὶ κινούντων συμβαίνει. εἰ οὖν ἐστη-
κότι μὲν προσμένει τὸ θερμόν, προσμένον δὲ μᾶλλον
θερμαίνει ἢ κινούμενον (ἀεὶ γὰρ τὸ σῶμα ἴδιον ἡμῶν
ἀτμίδα τινὰ χλιαρὰν ἀφήσιν ἀφ' ἑαυτοῦ, ἢ θερ-
μαίνει τὸν ἐγγὺς ἀέρα ὥσπερ δαλὸς παρών),
ἡρεμούντων μὲν ἡμῶν θερμὸς γίνεται ὁ περιέχων

¹ mss. have τὰ ἐφθὰ τῶν ὀπτῶν, but the above must be correct,
cf. 865 b 32.

ing waste products it immediately expels them, and is in motion and not at rest. For what remains behind becomes rank, like stagnant water, and what becomes rank and is not moved produces disease, but what is expelled passes away before becoming corrupted. When the body is dense this cannot occur (for the channels are, so to speak, blocked), but when it is rarefied this does take place. This is why one should not walk naked in the sun; for the flesh becomes solid, and grows absolutely fleshy, and the body grows moister. For what is within remains there and only what is on the surface is removed, as is also the case with meat which is roasted instead of boiled. Nor should one walk even with the chest bare; for in that case the sun extracts from the best constructed part of the body that which least needs such extraction, far less than the parts within. From these parts it is not easy to extract sweat because they are remote, except by means of exertion, but from the chest it is easy because it is near at hand.

Why are short walks exhausting? Is it because 35 they involve frequent halts, and the bending of the joints is not regular? And this is tiring.

Why does one grow hotter when standing in the 36 sun than when moving in it, in spite of the fact that movement is heating? Or is it a fact that not every movement produces heat, but that some movements are cooling? This occurs, for instance, if one blows upon a vessel of boiling water, and thus makes movement. If, then, heat remains in what is standing still, and produces more heat by remaining still than by moving (for our body is always giving off a warm vapour which heats the neighbouring atmosphere like a torch), when we are at rest the atmosphere which

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20 ἡμᾶς ἀὴρ διὰ τὰ εἰρημένα, κινουμένων δὲ πνεῦμα γίνεται, ὃ καταψύχει ἡμᾶς· πᾶν γὰρ πνεῦμα ψυχρὸν ἐστίν.

Διὰ τί οἱ ἐπὶ τῶν ἵππων ὀχούμενοι, ὅσῳ ἂν 37 θᾶπτον θέῃ ὁ ἵππος, τοσοῦτῳ μᾶλλον δακρύουσι τὰ ὄμματα, καὶ οἱ πεζοί, ὅσῳ ἂν μᾶλλον τρέχωσιν; 25 πότερον διὰ τὸ ψυχρὸν εἶναι τὸν προσπίπτοντα ἀέρα; τὸ γὰρ ψῦχος δακρύνει ποιεῖ· συστέλλον γὰρ καὶ πυκνοῦν τὴν σάρκα ἐκκαθαίρει τὸ ὑγρὸν. ἢ διὰ τοῦναντίον; τὸ γὰρ θερμὸν ποιεῖ ἰδρῶτας, τὸ δὲ δάκρυον ἰδρώς τίς ἐστίν. διὸ καὶ γίνονται ὑπὸ 30 θερμασίας ἄμφω ταῦτα, καὶ ἀλυκά ἐστίν ὁμοίως. ἢ δὲ κίνησις θερμότητα ποιεῖ. ἢ διὰ τὴν ὑπὸ τοῦ ἀέρος πληγὴν; ὡς γὰρ οἱ ἄνεμοι ταραττούσιν οἱ ἐξ ἐναντίας τὰ ὄμματα, οὕτω καὶ ὁ ἀὴρ ὁ προσπίπτων, ὅσῳ ἂν θᾶπτον ἐλαύνῃ ἢ αὐτὸς τρέχῃ, 35 τοσοῦτῳ μᾶλλον ποιεῖ πληγὴν μαλακὴν, δι' ἣν γίνεται δακρύνειν, ἀραιουμένων τῶν τοῦ ὀφθαλμοῦ πόρων ὑπὸ τῆς πληγῆς· πᾶσα γὰρ πληγὴ διαιρετικὸν ἐστίν ἢ θλαστικόν.

Διὰ τί δεῖ τοὺς μὲν θερινοὺς κόπους λουτρῶ 38 ἰᾶσθαι, τοὺς δὲ χειμερινοὺς ἀλείμματι; ἢ τούτους μὲν διὰ τὰς φρίκας καὶ τὰς γινομένας μεταβολὰς θερμῶ δεῖ λύειν, ὃ ποιήσῃ ἀλεάζειν (τὸ δὲ ἔλαιον 885 a θερμόν). ἐν δὲ τῷ θέρει καθυγραίνειν; ἢ γὰρ ὥρα ξηρά, καὶ οὐ γίνονται φρίκαι διὰ τὴν ἀλέαν. ὀλιγοσιτία δὲ καὶ κωθωνισμὸς θέρους, τὸ μὲν ὅλως, τὸ δὲ μᾶλλον, ὃ μὲν πότος θέρους ὅλως διὰ τὴν ξηρότητα, ἢ δὲ ὀλιγοσιτία κοινὸν μὲν, μᾶλλον δὲ 8 θερους· ἐκθερμαίνεται γὰρ μᾶλλον διὰ τὴν ὥραν ὑπὸ τῶν σιτίων.

Διὰ τί οἱ θέοντες εὐτόνως μάλιστα λαμβάνουσι 39

envelops us becomes hot for the reason given above, whereas when we move a breeze is created, which cools us ; for every breeze is cool.

Why do those who ride on horseback water more 37 freely at the eyes the faster the horse gallops, and men on foot the faster they run ? Is it because the air that strikes them is cold ? For it is cold which causes tears ; for by contracting and thickening the flesh it clears out the moisture. Or is it just the reverse ? For heat produces sweat, and tears are a kind of sweat. Both then are due to heat, and both are equally salt. But movement produces heat. Or is it due to the blow delivered by the air ? For just as the wind blowing from the opposite direction disturbs the eyes, so does the air falling on them ; the quicker a man rides or runs, the more does the air give a soft blow, with the result that tears flow, as the passages through the eyes become rarefied by the blow ; for every blow has either a separating or a crushing effect.

Why must summer fatigue be cured by a bath, but 38 winter fatigue by anointing with oil ? Is it because one must remove the latter, because of the shivering and the changes that have taken place, by something hot which will warm (and oil is warm) ; but in the summer it is necessary to produce moisture ? For this season is dry, and shivering does not occur because of the warmth. Light diet and plenty of liquid are necessary in summer, the former as a general rule, but the latter more than at other times ; drinking is generally necessary in summer because of the dryness, but light diet is necessary at both seasons, and particularly in summer ; for more heat is produced by food owing to the season.

Why does one suffer the greatest shock, if anyone 39

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σπάσματα, ὅταν τις θέουσιν αὐτοῖς ὑποστῆ; ἢ ὅτι
 ταῦτα μάλιστα διασπᾶται, ἃ εἰς τοῦναντίον τε καὶ
 ἰσχυρῶς ἔλκεται καὶ κινεῖται; ὅταν οὖν θέοντος
 10 καὶ σφοδρῶς ὠθουμένων τῶν μορίων εἰς τὸ πρόσθεν
 ὑποστῆ τις, συμβαίνει ἅμα ἀντισπᾶν εἰς τοῦναντίον,
 ἔτι φερομένων εἰς τοῦμπροσθεν, ὥστε ἡ σπάσις
 τοσοῦτω ἰσχυροτέρα γίνεται, ὅσω ἂν θέωσι σφο-
 δρότερον.

Διὰ τί τῶν περιπάτων οἱ κατὰ τὰς ὁδοὺς ἀ- 40
 15 κοπώτεροί εἰσιν οἱ ἀνώμαλοι τῶν εὐθέων; ἢ διὰ
 τὸ τὴν φορὰν ὀρθὴν εἶναι κατὰ φύσιν παντὶ τῷ
 σώματι; οἱ δ' ἐν τοῖς ὀμαλοῖς τῶν ἀνωμάτων
 κοπιωδέστεροι· τοῖς γὰρ αὐτοῖς μέρεσι τοὺς
 πόνους παρέχουσιν, οἱ δ' ἐν τοῖς ἀνωμάλοις δια-
 μερίζουσι μᾶλλον εἰς ἅπαν τὸ σῶμα. αἱ δὲ ἀλέαι
 20 μᾶλλον ἰσχυνοῦσι τῶν ἐν τοῖς ψύχεσιν· τοῖς γὰρ
 ἔξω μέρεσι πλείονα τὸν πόνον παρέχονται· διὸ καὶ
 τοὺς ἰδρῶτας ἐμποιοῦντες ἰσχυναίνουσιν. οἱ δ' ἐν
 τοῖς ψύχεσι στριφνοτέραν τὴν σάρκα ποιοῦσιν καὶ
 τῶν σιτίων ἐπιθυμητικωτέρους· τοῖς γὰρ ἔσω
 μέρεσιν τὴν αὔξησιν τοῦ θερμοῦ ποιοῦνται, καὶ
 25 δυσκινήτων γινομένων ὑπὸ τοῦ ψύχους τὸν μὲν
 ἔσω τόπον καθαίρουσι, τὴν θερμασίαν αὐξάνοντες
 ἐν αὐτῷ, τὴν δὲ σάρκα στερεὰν ποιοῦσιν, οὐ δυ-
 νάμενοι κρατεῖν διὰ πάσης αὐτῆς. ὁμοίως οἱ
 ἀνάνταις τῶν κατάντων ἐπιπονώτεροι καὶ ἰσχυραν-
 τικώτεροι. οἱ μὲν γὰρ ἀνάνταις τὴν ὀσφὺν μάλιστα
 30 ποιοῦσι πονεῖν, οἱ δὲ κατάνταις τοὺς μηρούς· τοῖς
 γὰρ μηροῖς τὸ βᾶρος πᾶν ἐμπίπτον κόπους εἴωθεν
 παρέχειν. ἄνω γὰρ παρὰ φύσιν [ὑπὸ τοῦ θερμοῦ]
 βία φερόμενος ἐκθερμαίνει. διὸ τοὺς τε ἰδρῶτας
 ἐμποιοῦσι, καὶ τὸ πνεῦμα μετεωρίζοντες ἰσχυναί-
 162

stands in the way when one is running hard? Is it because the greatest disturbance is produced, when there is a violent pull and movement in the opposite direction? When, then, one suddenly opposes a man who is running, when his limbs are being thrust violently forward, there is at once a counter shock in the opposite direction, while his limbs are still travelling forward, so that the more violently men are running, the greater is the shock.

Why is walking on an uneven road less exhausting 40 than walking on a straight road? Is it because an erect position is natural to everybody? So those who walk on level roads feel more fatigue than those who walk on uneven roads; for they are always causing exertion to the same limbs, but those who walk on an uneven surface distribute the strain over the whole body. Again, to the walker warm weather causes more thinness than cold; for it causes more exertion to the outer limbs; and the body grows thin as a result of sweating. But walking in cold weather hardens the flesh and engenders a greater desire for food; for it produces an increase of heat in the parts inside, and since they become less liable to be affected by the cold, it cleanses the region inside by increasing the heat in it, while it makes the flesh hard, because it cannot prevail over the whole of it. In the same way walking uphill is more laborious than walking downhill and tends to cause leanness. For walking uphill puts the greatest strain on the loins, and downhill on the thighs; for when all the weight rests on the thighs it usually causes fatigue. For being carried forcibly upwards contrary to nature, it^a produces heat. Walking uphill therefore engenders sweat and causes thinness by making the breath rise and creates

^a The subject of the sentence is not evident.

- 885 a
 35 νουσιν, καὶ τὴν ὀσφὺν ὀδυνῶσιν· τὰ γὰρ σκέλη
 χαλεπῶς ἀναγόμενα τὴν ὀσφὺν κάμπτουσίν τε καὶ
 ἀνασπῶσιν, ὑφ' ὧν ἀναγκάζονται μάλιστα πονεῖν.
 οἱ δ' ἐν ἀντιτύποις περίπατοι τοῖς τε μυσὶ καὶ τοῖς
 τεταμένοις τῶν σκελῶν παρέχουσι κόπους· συν-
 τάσεις γὰρ ἐμποιοῦσι τοῖς νεύροις καὶ τοῖς μυσί,
 885 b βιαίας γενομένης τῆς ἀπερείσεως αὐτοῖς. οἱ δ'
 ἐν τοῖς μαλακοῖς τοῖς ἄρθροις κοπιώδεις εἰσίν· τῶν
 γὰρ ἄρθρων πυκνὰς τὰς κάμψεις ποιοῦσιν, ἅτε
 ἐνδιδούσης τῆς βάσεως. τὸ δ' αὐτό ἐστι πρό-
 βλημα.
- 5 Διὰ τί πρὸς τὰ σιμὰ χαλεπῶς βαδίζομεν; ἢ 41
 διότι πᾶσα πορεία ἐξ ἄρσεως καὶ θέσεως συν-
 τελεῖται; τὸ μὲν οὖν ἄραι παρὰ φύσιν, τὸ δὲ
 θεῖναι κατὰ φύσιν, τὸ δὲ προθεῖναι¹ μεσότης· ἐν
 δὲ τῷ πρὸς τὰ σιμὰ βαδίζειν πολὺ τὸ παρὰ φύσιν.
- 10 Διὰ τί οἱ ἀφ' ἵππων ἤττον πίπτουσιν; ἢ διὰ τὸ 42
 φοβεῖσθαι φυλάττονται μᾶλλον;

¹ προθεῖναι from Th. G. who renders *proponeere*: προσθεῖναι Ruelle.

PROBLEMS, V. 40-42

pain in the loin ; for as the legs are raised with difficulty they bend and draw up the loin, as a result of which they must feel great pain. Walking on resistant ground causes weariness to the muscles and tendons of the legs, for it causes extension of the sinews and muscles, when the pressure on them is violent. But walking on soft ground is also tiring to the joints ; for it involves frequent bending of the joints, as the surface gives way. This is the same problem.

Why do we find it difficult to walk up a steep hill ? 41
Is it because all walking is accomplished by raising and lowering the foot ? Now to raise it is unnatural, but to lower it is natural, and to put it forward is between the two ; but in going up a steep hill, the unnatural movement is the more frequent.

Why do men not often fall on horseback ? Are 42
they more careful because they are afraid ?

ΟΣΑ ΕΚ ΤΟΥ ΠΩΣ ΚΕΙΣΘΑΙ ΚΑΙ
ΕΣΧΗΜΑΤΙΣΘΑΙ ΣΥΜΒΑΙΝΕΙ

885 b

15 Διὰ τί ἡ καθέδρα τοὺς μὲν παχύνει τῶν ἀνθρώ- 1
πων, τοὺς δὲ ἰσχναίνει; πότερον (ὅτι) αἱ ἕξεις
διαφέρουσιν; οἱ μὲν γὰρ θερμοὶ εἰσιν, οἱ δὲ
ψυχροί. οἱ μὲν οὖν θερμοὶ παχύνονται (κρατεῖ
γὰρ τὸ σῶμα τῆς τροφῆς διὰ τὴν θερμασίαν). οἱ
δ' ἐψυγμένοι, διὰ τὸ δεῖσθαι ἐπεισάκτου θερμό-
20 τητος καὶ τοῦτο πάσχειν μάλιστα τὸ σῶμα ὑπὸ
τῶν κινήσεων, οὐ δύνανται πέττειν ἠρεμοῦντες.
ἢ ὅτι οἱ μὲν περιττωματικοὶ εἰσι, καὶ δέονται
κινήσεως ἢ ἀναλώσει ταῦτα, οἱ δὲ οὐ;

Διὰ τί δεῖ ποιεῖν διάτασιν τῶν μερῶν, ὃ ποιεῖ ὁ 2
γυμναζόμενος; ἢ ὅτι δεῖ τῷ οἰκείῳ πνεύματι
25 καθαίρεσθαι τοὺς πόρους;

Διὰ τί συγκεκαμμένον βέλτιον κατακεῖσθαι, καὶ 3
πολλοί γε παραγγέλλουσιν τοῦτο καὶ τῶν ἰατρῶν;
ἢ ὅτι ἀλεαίνουσα ἡ κοιλία θάπτον πέττει; οὕτω δὲ
καὶ ἀλεαίνει μᾶλλον. ἔτι δεῖ τοῖς πνεύμασι τόπον
διδόναι εἰς ὃν ἀπερείσονται. οὕτω γὰρ ἠκιστα
30 λυπήσουσιν αἱ φύσαι. διὰ τοῦτο γὰρ καὶ ἰξίαί καὶ
τὰ ἄλλα ἀποστήματα ὑγιεινόν, ὅτι ἔχουσι κοιλίας
εἰς ἃς ἀποδέχονται τὰ πνεύματα. ἐκτεταμένου
μὲν οὖν οὐ γίνεται κοιλία (ἅπαντα γὰρ τὸν τόπον
τὰ σπλάγχνα κατέχει), συγκαμφθέντος δὲ γίνεται.

BOOK VI

PROBLEMS WHICH ARISE FROM LYING DOWN AND TAKING UP POSITIONS

WHY does sitting down make some men fat, and 1 other men thin? Is it because their constitutions differ? For some are hot and others are cold. The hot grow fat (*i.e.* by sitting down); (for the body prevails over its food by means of heat;) but the cold, because they need extraneous heat and the body derives this mostly from movement, cannot digest their food when at rest. Or is it because some men are full of waste products and need movement to expend them, whereas others do not?

Why must one stretch the limbs, as the athlete 2 does? Is it because the passages must be cleansed by the natural breath?

Why is it better to lie down with the limbs bent, and 3 why do many doctors advise this? Is it because the stomach digests better when it is warm? And in this position it warms more easily. It is also necessary to give the breath a place in which it can collect; for thus flatulence will cause less trouble. This is why varicocele and abscesses restore health, because they have hollows in which they receive the breath. When one lies stretched out at full length, such a hollow does not exist (for the internal organs fill all the space), but when curved it does exist.

885 b
35 Διὰ τί ἀνισταμένοις ἱλιγγος μᾶλλον γίνεται ἢ 4
καθιζάνουσιν; ἢ διότι ἡρεμοῦσι τὸ ὑγρὸν εἰς ἓν
μόριον ἀθρόον ἀποκλίνει; διὸ καὶ τὰ ὤμα ὡὰ οὐ
δύναται δινεῖσθαι, ἀλλὰ καταπίπτει. κινούμενον
886 a δὲ τὸ ὑγρὸν ὁμοίως ἔχει. ἀνίστανται μὲν οὖν
ἡρεμήσαντες, ὅτε οὕτως διάκεινται· καθιζάνουσιν
δὲ ἐν κινήσει γερόμενοι, ὅτε ὁμαλῶς ἔχει τὸ ὑγρὸν
καὶ ἐσκέδασται.

Διὰ τί ἐπὶ τὰ δεξιὰ κατακειμένοις μᾶλλον 5
ἐπέρχεται ὕπνος; πότερον ὅτι ἐναντίως ἔχοντες
5 ἐγρηγόρασιν καὶ καθεύδουσιν; ἐπεὶ οὖν ἐγρη-
γορότες ἐπὶ τὰ ἀριστερὰ κατάκεινται, τοῦναντίον
ἔσται ἐπ' ἄλλης ἀρχῆς καὶ τῆς ἐναντίας. ἢ ὅτι
ἀκινήσια ὁ ὕπνος; τὰ μὲν οὖν κινητικὰ μέρη δεῖ
ἡρεμεῖν, τὰ δὲ δεξιὰ κινητικά. οὕτω δὲ κατα-
κειμένων οἶον δέδεται ἀρχὴ τις ἐπεγερτική.

10 Διὰ τί ναρκῶσι; καὶ διὰ τί χεῖρας καὶ πόδας 6
μᾶλλον; ἢ ὅτι κατάψυξις ἐστὶν ἢ νάρκη; διὰ
στέρησιν γὰρ αἵματος γίνεται καὶ μετάστασιν.
ἀσαρκότατα δὲ ταῦτα καὶ νευρωδέστατα, μάλιστα
δὲ οἱ πόδες. ὥστε προοδοποιεῖται ὑπὸ τῆς φύσεως
πρὸς τὸ καταψύχεσθαι ταχέως.

15 Διὰ τί κατακείμεθα μὲν ἐπὶ τὰ ἀριστερὰ ἠδέως, 7
καθεύδομεν δὲ ἐπὶ τὰ δεξιὰ μᾶλλον; πότερον ὅτι
ἀποστραφέντες πρὸς τὸ φῶς οὐ βλέπομεν; ἐν γὰρ
τῷ σκότει θᾶπτον ὕπνος λαμβάνει. ἢ διότι ἐγρη-
γόραμεν κατακείμενοι ἐπὶ τοῖς ἀριστεροῖς, καὶ αἱ
χρήσεις ἡμῖν οὕτω πρόχειροι, ὥστε πρὸς τὸ ἐναντίον
20 <τὸ ἐναντίον>¹ σχῆμα πρὸ ἔργου; παρακαλεῖ δὲ
ἕκαστον πρὸς τὸ ἔργον τὸ σχῆμα μᾶλλον.

¹ The second τὸ ἐναντίον is not found in the mss., but is required and appears in Th. G. and was added by Bekker.

PROBLEMS, VI. 4-7

Why does giddiness attack men when they stand 4 up more than when they sit down? Is it because when they are at rest the moisture all tends to one part? This is why it is impossible for raw eggs to be spun round, for they fall over. A similar thing occurs with moisture which is moved. So men stand up after resting, when they are in this condition; but after having been in motion they sit down, when the moisture is evenly distributed and dispersed.

Why does sleep come more easily when one lies 5 on the right side? Is it because being awake and asleep are opposite conditions? Since, then, when awake we lie on the left side, the opposite condition will arise from the opposite cause. Is it due to the fact that sleep implies cessation of movement? It is the moving parts which must rest, and the right is the moving side. When one lies in this position a source of awakening is, as it were, enchained.

Why do men feel numb? And why more in the 6 hands and feet than elsewhere? Is it because numbness is due to cooling? For it is the removal and shifting of blood which produces it. Now these parts are the least fleshy and the most sinewy, especially the feet. So that they are predisposed by nature to become chilled quickly.

Why do we lie comfortably on our left side, but 7 sleep more easily on our right? Is it because by turning over we do not face the light? For sleep gains mastery more easily in the dark. Or is it because we rest awake on our left side, and in this position employment is easy, so that for an opposite purpose an opposite position is an advantage? For each position invites us to its appropriate action.

Ζ

ΟΣΑ ΕΚ ΣΥΜΠΑΘΕΙΑΣ

886 a

Διὰ τί τοῖς χασμωμένοις ἀντιχασμῶνται ὡς ἐπὶ 1
 25 τὸ πολὺ; ἢ διότι, εἰ ἀναμνησθῶσιν ὀργῶντες,
 ἐνεργοῦσιν, μάλιστα δὲ τὰ εὐκίνητα, οἷον οὐροῦσιν.
 ἢ δὲ χάσμη πνεῦμα καὶ ὑγροῦ κίνησις ἐστίν.
 πρόχειρον οὖν, εἰ μόνον νοήσῃ· ἔστι γὰρ
 πλησίον.

Διὰ τί, εἰ μὲν τινα ἴδωμεν τὴν χεῖρα ἐκτείνοντα 2
 30 ἢ τὸν πόδα ἢ ἄλλο τι τῶν τοιούτων, οὐκ ἀντιποιοῦ-
 μεν τὸ αὐτό, εἰ δὲ χασμώμενον, ἀντιχασμώμεθα;
 ἢ οὐδὲ τοῦτο αἰεὶ, ἀλλ' εἰ ὀργῶν τύχῃ τὸ σῶμα
 καὶ οὕτω διακείμενον ὥστε τὸ ὑγρὸν ἀναθερμαί-
 νεσθαι; τότε γὰρ ἢ μνήμη τὴν κίνησιν ποιεῖ,
 ὥσπερ καὶ πρὸς ἀφροδίσια καὶ ἐδωδὴν· τὸ γὰρ
 35 ποιῆσαν μνήμην εἶναι τὸ ἔχον ὄρμην πρὸς τὸ
 φαντασθὲν πάθος.

Διὰ τί, ἐπειδὴν πρὸς τὸ πῦρ στῶμεν, οὐρητιῶ- 3
 μεν, καὶ εἰ πρὸς ὕδωρ, οἷον εἰ πρὸς ποταμόν,
 886 b οὐροῦσιν; ἢ ὅτι τὸ πᾶν ὕδωρ ὑπόμνησιν δίδωσιν
 τῆς ἐν τῷ σώματι ὑγρότητος, καὶ ἐκκαλεῖται τὸ
 προσιόν; αὐτὸ δὲ τὸ πῦρ διαχαλᾷ τὸ πεπηγὸς ἐν
 τῷ σώματι, ὥσπερ ὁ ἥλιος τὴν χιόνα.

Διὰ τί ἀπὸ μὲν νόσων ἐνίων νοσοῦσιν οἱ πλησιά- 4
 5 ζοντες, ἀπὸ δὲ ὑγείας οὐδεὶς ὑγιάζεται; ἢ ὅτι ἢ

BOOK VII

PROBLEMS ARISING FROM SYMPATHY

WHY is it that when men yawn others usually yawn 1 in sympathy? Is it because if men are reminded of a desire, they put it into action, especially with easily promoted action such as the passing of water? Now yawning is breath and the movement of moisture. So it is always available, if only one thinks of it; for it is near at hand.

Why is it that, if we see a man stretching out his 2 hand or his foot or anything of the kind, we do not do the same thing in sympathy, but if we see him yawn, we yawn in sympathy? Or do we not always do so, but only if the body happens to desire it, and is in such a condition that the moisture grows warm? For in that case recollection produces movement, just as it does with sexual desire and food; for that which causes recollection to occur is that which produces an impulse towards the imagined condition.

Why do we desire to make water when we stand 3 near the fire, and if we stand near water, for instance a river, we do make water? Is it because all water reminds us of the moisture in the body, and calls out what is near to it? Also fire of itself melts what is congealed in our bodies, just as the sun melts the snow.

Why are those in contact infected by some diseases, 4 whereas no one becomes healthy by contact with

886 b

μὲν νόσος κίνησις, ἢ δὲ ὑγίεια ἡρεμία; ἢ μὲν οὖν
κινεῖ, ἢ δ' οὐθέν. ἢ διότι τὸ μὲν ἄκοντι, τὸ δ'
ἐκόντι γίνεται; καὶ ἄρα τὰ ἀκούσια τῶν ἐκουσίων
καὶ τῶν ἐκ προνοίας διαφέρει.

Διὰ τί τῶν μὲν διὰ τῆς ἀκοῆς λυπηρῶν ἔνια 5
10 φρίπτειν ἡμᾶς ποιεῖ, οἷον πρίων ἀκονώμενος καὶ
κίσηρις τεμνομένη καὶ λίθος ἀλούμενος, τὰ δὲ διὰ
τῆς ὄψεως σημεία τῶν παθῶν αὐτὰ ἡμῖν τὰ πάθη
ἐμποιεῖ; αἰμωδιῶμέν τε γὰρ τοὺς ὄξυ ὄρωντες
ἐσθίοντας, καὶ τοὺς ἀπαγχομένους ἔνιοι ὄρωντες
ἐκψύχουσιν. ἢ διότι φωνὴ μὲν πᾶσα καὶ ψόφος
15 πνεῦμά ἐστιν; τοῦτο δὲ εἰσδυόμενον ἡμῖν πέφυκεν
κινεῖν. κινήσει δὲ μᾶλλον ἢ διὰ μέγεθος ἢ διὰ
πληγὴν σφοδρότεραν, ποιοῦν ἢ ἀλλοιοῦν τι τῶν ἐν
ἡμῖν. τὰ μὲν οὖν μεγάλα καὶ λεῖα πνεύματα τὸν
τῆς αἰσθήσεως τόπον αὐτὸν κινεῖ, διὸ καὶ ἡδύνει
τὰ τοιαῦτα· τὰ δὲ τραχέα, πληγὴν ποιοῦντα σφο-
20 δρᾶν, σείει τε τὸν τόπον καὶ πόρρω διαδίδωσιν τῆ
τῆς πληγῆς δυνάμει. διαδίδωσι δὲ καὶ τὰ ψυχρὰ
πόρρω· δύναμις γάρ τις ἐστὶν ἢ ψυχρότης. αὕτη
μὲν οὖν ὅτι φρίπτειν ποιεῖ, εἴρηται. τὰ δὲ τραχέα
τῷ πληγὴν ποιεῖν πυκνήν, προσκόπτοντα τῇ
ἀρχῇ τῶν τριχῶν, ἀπωθεῖ αὐτὴν εἰς τοῦναντίον·
25 ἀπωθουμένης δὲ ἀνάγκη τὴν κορυφὴν τῆς τριχὸς
ἀνάπαλιν γίνεσθαι· διὸ συμβαίνει ἴστασθαι αὐτάς·
πᾶσαι γὰρ νενεύκασι κάτω. ἢ δὲ φορὰ τοῦ διὰ
τῆς ἀκοῆς πνεύματος εἰς τὸ σῶμα ἄνωθεν κάτω
ἐστίν. ὄντων οὖν τραχέων τῶν εἰρημένων ψόφων,
ἢ φρίκη γίνοιτ' ἂν διὰ τὰ εἰρημένα. γίνονται δ'
30 αὐταὶ μᾶλλον τῷ ἄλλῳ σώματι ἢ ἐν τῇ κεφαλῇ

PROBLEMS, VII. 4-5

health? Is it because disease implies motion, while health is a state of rest? The former, then, moves, but the latter does not. Or is it because the former is contrary to a man's will, the latter in accordance with it? And involuntary acts differ from voluntary and from those due to forethought.

Why do some things unpleasant to hear make us shudder, such as the sharpening of a saw, the cutting of pumice-stone, and the grinding of stone, and the signs we see of their effects on others themselves produce the same feelings in us? For our teeth are set on edge when we see others eating something bitter, and some faint when they see others choking. Is it because every voice and every sound is air? This entering into us naturally produces an impulse. It will be all the greater in proportion as it is itself great, or acts with a violent blow, because it sets up or alters a condition in ourselves. Breaths which are at once considerable and yet gentle affect the region of sensation, and in this way cause pleasure; but rough breaths, having the effect of a violent blow, disturb this region, and travel farther by the power of the blow. Now cold things also travel farther; for coldness is in a sense a force. We have already remarked that it makes one shudder. But rough air, because it gives a violent blow, falling as it does on the source of the hair, thrusts it in the opposite direction; when this thrust occurs, the top of the hair must go the wrong way; consequently the hair stands on end. Beforehand it has all inclined downwards. Now the direction in which the air travels by hearing to the body is downwards from above. As, therefore, the aforementioned sounds are rough, bristling must be due to the causes we have given. They have more effect on the rest of the body than on the head,

886^b διὰ τὸ τὰς ἐνταῦθα τρίχας ἀσθενεστέρας εἶναι καὶ
τὸ πάθος ἀσθενές. τῆς μὲν οὖν ἀκοῆς οὔσης ἀμ-
βλυτέρας αἰσθήσεως ἢ τῆς ὄψεως, ἐπιπόλαια καὶ
τὰ πάθη γίνεται ἀπ' αὐτῆς· ἢ δὲ φρίκη τοιοῦτον,
35 διὸ καὶ ἀπὸ πολλῶν καὶ ἀνομοίων γίνεται. τῆς
δὲ ὄψεως ἐναργεστάτης οὔσης αἰσθήσεως, ἀνάλογον
καὶ τὰ συμβαίνοντα γίνεται ἀπ' αὐτῆς· διὸ ταῦτα
μὲν τὰ ἀπὸ τῆς ἀληθείας πάθη συμβαίνει γίνεσθαι
887^a ἀπ' αὐτῆς, ἐλαφρότερα δὲ τῆς ἀληθείας. ἀπὸ δὲ
τῆς ἀκοῆς αὐτὰ μὲν οὐ, τὴν δ' ἀπ' αὐτῶν προσ-
δοκίαν φρίττομεν· ἀλγεινοῦ γὰρ κακοῦ προσδοκία
ἐστίν.

Διὰ τί χασμησαμένοις ἀντιχασμῶνται, καὶ ὅταν 6
5 οὔρουντα ἴδωσιν, οὔρουσι, καὶ μάλιστα τὰ ὑπο-
ζύγια; ἢ διὰ τὴν μνήμην; ὅταν γὰρ μνησθῆ,
κινεῖται τοῦτο τὸ μέρος. τοῖς μὲν οὖν ἀνθρώποις,
διὰ τὸ εὐαισθητοτέροις εἶναι, ἰδοῦσιν εὐθὺς συμ-
βαίνει κινεῖσθαι καὶ ἀναμιμνήσκεσθαι· τοῖς δὲ
ὑπόζυγίοις οὐκ αὐτάρκες τὸ ἰδεῖν, ἀλλὰ προσ-
10 δέονται καὶ ἄλλης αἰσθήσεως· διὸ καὶ ὀσφρανθέντα,
ὅτι εὐκινητοτέρα αὕτη ἢ αἴσθησις τοῖς ἄνευ λόγου.
καὶ διὰ τοῦτο εἰς τὸν αὐτὸν τόπον ἅπαντα οὔρεῖ,
οὐ ἂν τὸ πρῶτον οὔρησῃ. τότε γὰρ μάλιστα
κινουῦνται, ὅταν ὀσφρανθῶσιν· ὀσφραίνονται δ',
ὅταν πλησιάσωσιν.

15 Διὰ τί, ἐπειδὴν τεμνόμενόν τινα ἴδωμεν ἢ καιό- 7
μενον ἢ στρεβλούμενον ἢ ἄλλο τι τῶν δεινῶν
πάσχοντα, συναλοῦμεν τῇ διανοίᾳ; ἢ ὅτι ἢ
φύσις ἡμῖν κοινὴ ἅπασιν; συνήλγησεν οὖν, ἐπειδὴν
τι τοιοῦτον ἴδῃ, τῷ πάσχοντι διὰ τὴν οἰκειότητα.
ἢ ὅτι ὡσπερ αἱ ῥῖνες καὶ αἱ ἀκοαὶ λαμβάνουσί
20 τινὰς ἀπορροίας κατὰ τὰς οἰκείας δυνάμεις, οὕτω

because the hair there is weaker, and so the effect is weak. Now hearing is a duller perception than sight, and consequently the effects arising from it are superficial; shuddering is of this kind and so arises from a variety of different causes. But sight is the sharpest of all the senses, and the effects produced by it are correspondingly great. Consequently the same effects are produced by it as occur in reality, but with less violence than in the original. With hearing it is not so, but we shudder at the expectations which they arouse; for it is an expectation of a painful ill.

Why does one yawn in sympathy when others yawn, and make water when one sees another doing so? Baggage animals do this especially. Is it due to recollection? For when one remembers the part is moved. In the case of men, because they are particularly sensitive, the sight immediately moves them, and makes them remember; but in the case of baggage animals, sight itself is not sufficient; they need another sense as well; so it is due also to smell, because among irrational animals this sense is more easily affected; for this reason they all make water at the same place as the first has done. For they are most easily moved when they smell; and they smell when they are near by.

Why is it that when we see anyone cut or burned or tortured or suffering pain from any other cause, we also suffer in mind? Is it because nature is common to all of us? Hence when we see anything of the kind we feel pain in sympathy with the sufferer, because of our kinship. Or is it that, just as the nose and the ears receive certain emanations according to their particular capacities, so also does the sight

887 a καὶ ἡ ὄψις αὐτὸ πάσχει καὶ ἀπὸ τῶν ἠδέων καὶ λυπηρῶν;

Διὰ τί ἀπὸ φθίσεως καὶ ὀφθαλμίας καὶ ψώρας οἱ 8
 πλησιάζοντες ἀλίσκονται, ἀπὸ δὲ ὕδρωπος καὶ
 πυρετῶν καὶ ἀποπληξίας οὐχ ἀλίσκονται, οὐδὲ τῶν
 25 ἄλλων; ἢ ἡ μὲν ὀφθαλμία, ὅτι εὐκινητότατον ὁ
 ὀφθαλμός, καὶ μάλιστα ὁμοιοῦται τῷ ὀρωμένῳ τῶν
 ἄλλων, οἷον κινεῖται ἀπὸ κινουμένου ὥστε καὶ
 ἀντιβλέπων τεταραγμένῳ ταραττεται μάλιστα; ἢ
 δὲ φθίσις, ὅτι πνεῦμα φαῦλον ποιεῖ καὶ βαρύ,
 τάχιστα δὲ τὰ νοσήματα ταῦτα ἄπτεται πάντων,
 30 ὅσα τούτου φθειρομένου γίνεται, οἷον τὰ λοιμώδη.
 ὁ δὲ πλησιάζων τοιοῦτον ἀναπνεῖ. νοσεῖ μὲν οὖν,
 ὅτι νοσῶδες· ἀπὸ μόνου δέ, ὅτι ἐκπνεῖ, νοσεῖ, οἱ
 δὲ ἄλλοι ἐτέρως· τὴν αὐτὴν δὲ νόσον, ὅτι ὡς ἂν
 ἀσθενήσῃ, τούτῳ ἀναπνεῖ τοιοῦτον οἷον εἰ πεπονθῶς
 ἦν. ἢ δὲ ψώρα μᾶλλον τῶν ἄλλων, οἷον λέπρας
 35 καὶ τῶν τοιούτων, ὅτι ἐπιπολῆς τε καὶ γλίσχρον
 τὸ ἀπορρέον· τὰ γὰρ κνησμώδη τοιαῦτα. διὸ αὕτη¹
 τῷ ἐπιπολῆς γίνεσθαι καὶ γλίσχρον εἶναι ἄπτεται.
 τῶν δ' ἄλλων τὰ μὲν οὐχ ἄπτεται διὰ τὸ μὴ ἐπι-
 πολῆς γίνεσθαι, τὰ δὲ ὄντα ἐπιπολῆς, ὅτι οὐ προσ-
 μένει διὰ ξηρότητα.

887 b Διὰ τί τὴν αἰμωδίαν παύει ἡ ἀνδράχνη καὶ ἄλες; 9
 ἢ ὅτι ἡ μὲν ὑγρότητα τινὰ ἔχει; φανερὰ δὲ αὕτη
 μασωμένοις τε, καὶ συνθλασθῆ² χρόνον τινά· ἔλκεται

¹ αὕτη Richards : αὐτὰ Ruelle.

² συνθλασθῆ Forster from 863 b 13 : συντεθῆ Ruelle.

PROBLEMS, VII. 7-9

from seeing both what is pleasant and what is painful?

Why are those in contact with phthisis, ophthalmia 8 and scurvy infected by them, but are not infected by dropsy, fever and apoplexy nor by many other diseases? In ophthalmia it is due to the fact that the eye is most easily moved, and is more inclined than the other senses to assimilate itself to what it sees; for instance, it moves when the object of sight moves, so that when it looks at an eye which is disturbed it is very easily disturbed. In phthisis it is due to the fact that it makes the breathing poor and laboured and those diseases are most easily contracted which are due to decay of breath, such as plague in any form. The one who is in contact breathes this breath. He becomes diseased because the breath is diseased; he only is infected by the one person, because he exhales; the others exhale differently. He is infected with the same disease, because when he inhales the breath which makes him ill, he is inhaling the same breath as he would do if he were suffering from the disease. Scurvy is more infectious than other diseases, like leprosy and similar complaints, because the discharge is superficial and viscous; for itching diseases are of this kind. This disease is therefore infectious, because the discharge is superficial and viscous. Of other diseases some are not infectious, because they are not superficial, and others which are superficial are not catching because owing to their dryness they do not remain on the surface.

Why do purslane and salt stop inflammation of the 9 gums? Is it because the former contains moisture? This is evident if one chews it or if it is crunched for a considerable time, for the moisture is drawn out

ARISTOTLE

887 b γὰρ ἢ ὑγρότης. τὸ δὴ γλίσχρον εἰσδυόμενον
5 ἐξάγει τὸ ὄξύ. καὶ γὰρ ὅτι συγγενῆς ἢ ὀξύτης
σημαίνει· ἔχει γάρ τινα ὀξύτητα ὁ χυλός. ὁ δὲ
ἄλς συντήκων ἐξάγει καὶ τὴν ὀξύτητα. διὰ τί οὖν
ἢ κονία καὶ τὸ νίτρον οὐ; ἢ ὅτι στύφει καὶ οὐ
τήκει;

PROBLEMS, VII. 9

of it. The viscous part of it penetrates the body and draws out the acid element. For the acidity shows that it is of the same nature as the disease, for the sap has an element of acidity. But salt melts and so draws out the acidity. Why, then, will not ashes and nitre do the same thing? Is it because they are astringent and do not cause melting?

Η

ΟΣΑ ΕΚ ΡΙΓΟΥΣ ΚΑΙ ΦΡΙΚΗΣ

887 b

10 Διὰ τί οἱ ριγῶντες πελιδνοὶ γίνονται; ἢ διότι 1
τὸ αἷμα πήγνυται διὰ τὸ ψῦχος, πηγνύμενον δὲ
μελαίνεται διὰ τὴν ἀπουσίαν τοῦ θερμοῦ; τὸ δὲ
λευκὸν τοῦ πυρός. διὸ καὶ τοῖς πρεσβύταις
μάλιστα πελιοῦται ἢ σὰρξ, ὅτι ἐλαχίστην ἔχει
θερμότητα.

15 Διὰ τί οἱ ριγῶντες καθεύδειν οὐ δύνανται; <ἢ> 2
διότι πάντες οἱ ριγῶντες μᾶλλον τὸ πνεῦμα κατ-
έχουσιν, ὁ δὲ καθεύδων ἐκπνεῖ μᾶλλον ἢ εἰσπνεῖ,
ὥστε χαλεπὸν ριγῶντα καθεύδειν· ἅμα γὰρ ποιεῖν
τᾶναντία ἀδύνατον;

Διὰ τί ἐν τῷ ψύχει ὀξύτεροι καὶ οἱ ἀσθενήσαντες 3
20 καὶ οἱ λυπούμενοι καὶ οἱ ὀργιζόμενοι; ἢ στιφρό-
τερον ποιεῖ τὸ καταψύχεσθαι;

Διὰ τί οἱ ἀθληταὶ δύσριγοι εὖ ἔχοντες; ἢ ὅτι 4
καθαρὰ καὶ εὐπνοὺς ἢ ἔξις καὶ ἀπίμελος; ἢ
τοιαύτη δὲ εὐπαθεστάτη ὑπὸ τοῦ ἀέρος, ὅταν
25 εὐδιδόδος τε ἢ καὶ μὴ ἔχη θερμότητα ἐν αὐτῇ· ἢ
δὲ πιμελὴ θερμόν, ἂν μὴ δίυγρος.

Διὰ τί μάλιστα τὰ ἀκρωτήρια ριγῶσιν; ἢ διὰ 5
στενότητα; καὶ οἱ πόροι ἐν αὐτοῖς στενοὶ ὄντες
ὀλίγαιμοί εἰσιν, ὥστε καὶ ὀλιγόθερμοί εἰσιν· τὸ
γὰρ αἷμα θερμόν.

BOOK VIII

PROBLEMS CONCERNED WITH CHILL AND SHIVERING

WHY do those who are chilled become livid? Is it ¹ because the blood congeals owing to the cold, and when it congeals becomes black owing to the absence of heat? For white is the colour of fire. So the flesh of the old becomes livid, because it contains very little heat.

Why cannot those who are chilled sleep? Is it ² because all cold persons restrain the breath more, but in sleeping one exhales more than inhales, so that it is difficult for a cold man to sleep, for it is impossible to perform two opposite actions at the same time?

Why are the sick, the sorrowful and the angry ³ more energetic in cold weather? Is it because being cold makes one stronger?

Why are athletes in good condition impatient of ⁴ cold? Is it because their condition is clean, airy and free from fat? This condition is most easily affected by the air, since it is easily penetrated and has no heat in it, but fat is hot, unless it is wet.

Why do the extremities become most chilled? Is ⁵ it because they are so narrow? The channels in them, because they are narrow, hold but little blood, so that they contain little heat, for blood is hot.

887 b Διὰ τί, ἐὰν μετέωροι ὦσιν οἱ πόδες, μᾶλλον 6
 30 ῥιγοῦσιν; πότερον ὑποπνεῖ μᾶλλον; ἢ ὅτι ἐν
 ἐλάττονι γίνεται τὸ αἷμα κάτω, ὥστε τὸ ἄλλο
 εὐψυκτότερον ἐκλείποντος τοῦ θερμοῦ;

Διὰ τί οἱ παχεῖς σφόδρα ῥιγοῦσι, τῆς πιότητος 7
 θερμῆς οὔσης; ἢ διὰ τὸ μέγεθος τοῦ πάχους τοῦ
 μὲν ἔσωθεν θερμοῦ πόρρω γίνονται τὰ ἔσχατα, τοῦ
 δὲ ἔξω ψυχροῦ τὰ ἐγγύς;

85 Διὰ τί πταρέντες καὶ οὐρήσαντες φρίττουσιν; 8
 ἢ ὅτι κενοῦνται αἱ φλέβες ἐν ἀμφοτέροις, κενω-
 θέντων δὲ ὁ ἀῆρ εἰσέρχεται ψυχρός, ὁ ποιῶν
 φρίττειν;

Διὰ τί μάλιστα βουλιμιῶσιν ἐπὶ τῷ ψύχει, καὶ 9
 τοῦ χειμῶνος μᾶλλον ἢ τοῦ θέρους; ἢ διότι ἢ μὲν
 888 a βουλιμία γίνεται δι' ἔνδειαν τῆς ξηρᾶς τροφῆς, ἐν
 δὲ τῷ ψύχει καὶ τῷ χειμῶνι συστέλλομένου τοῦ
 ἐντὸς θερμοῦ εἰς ἐλάττω τρόπον θᾶπτον ὑπολείπει
 ἢ ἐντὸς τροφή· τούτου δὲ γινομένου μᾶλλον βου-
 λιμιᾶν εἰκός. ἢ δ' ἐν τῇ βουλιμίᾳ ἔκλυσις καὶ
 5 ἀδυναμία γίνεται συντήξεως γινομένης ἐν τῷ
 σώματι διὰ τὴν τοῦ θερμοῦ ἀθροισιν, ἧς ῥυείσης
 μὲν εἰς τὸν τῶν σιτίων τρόπον αὐτὴ τροφή γίνεται
 τῷ σώματι· ἐὰν δ' ἐπὶ τὰς ἀρχὰς τῆς ἀναπνοῆς
 ἔλθῃ, ἀφωνία καὶ ἀδυναμία συμβαίνει, ἀφωνία μὲν
 διὰ τὸ ἐμφράττεσθαι τὸν τοῦ πνεύματος πόρον,
 10 ἀδυναμία δὲ διὰ τὴν τοῦ σώματος ἀτροφίαν καὶ
 σύντηξιν. ταχεῖαι δὲ καὶ ἀπ' ὀλίγων αἱ βοήθειαι
 γίνονται τοῖς τοιούτοις διὰ τὸ τὴν ἀρχὴν τοῦ
 πάθους ἔξωθεν γίνεσθαι. συστέλλον γὰρ τὸ ἐντὸς
 ψυχρὸν τὸ θερμὸν ἡμῶν ποιεῖ τὴν βουλιμίαν.
 καθάπερ οὖν ἐν τῷ φόβῳ τρέμοντες καὶ ὠχριῶντες,

PROBLEMS, VIII. 6-9

Why do the feet grow more cold if they are held 6 up? Is it because there is more air blowing beneath them? Or is it because the blood is collected in a smaller space below, so that the remainder is more easily chilled when the heat leaves it?

Why do fat people especially grow chilled, seeing 7 that fat is hot? Is it because owing to their great bulk the extremities are far from the internal heat, but the near parts are far from the external cold?

Why do men shiver when they have sneezed and 8 passed water? Is it because in both cases the veins are emptied, and when they are emptied the cold air enters, which makes them shiver?

Why do men feel hunger most in the cold, and in 9 winter more than the summer? Is it because hunger is due to the absence of dry food, and in the cold weather and in winter the internal heat is contracted into a smaller space, so that the food within is quickly exhausted? When this occurs it is natural to feel more hungry. But the relaxed condition and weakness which occur in great hunger are due to the melting which takes place in the body owing to the collection of heat; this liquid flows into the food receptacle, and itself takes the place of food for the body; if, then, it reaches the source of breathing, dumbness and weakness follow, dumbness because the channel of the breath is blocked, weakness because of the lack of sustenance to the body and its melting. In such cases assistance quickly comes from small causes, because the origin of the trouble is external. For the internal cold contracts our natural heat and makes us desperately hungry. For just as when men are trembling with fright and growing pale, but as soon as

888 a
 15 ἀφεθέντες¹ τοῦ κινδύνου, παραχρῆμα οἱ αὐτοὶ γίνονται, οὕτω καὶ οἱ βουλιμιῶντες μικρὰ προσεγγεγάμενοι ἐξ ἄρτου, βία κινήθεντες ἐκ τῆς φύσεως, μὴ φθαρέντες δέ· ταχεῖα ἢ ἀποκατάστασις γίνεται. ταῦτό γὰρ ἀντέτεινεν τήν τε κατὰ φύσιν ἀγωγὴν, καὶ καθίστησιν εἰς τὴν φύσιν. ἀφεῖναι οὖν μόνον
 20 αὐτὴν δεῖ, καὶ καθάπερ τῶν παιδίων τὰ ἀντιτείνοντα εἰς τοῦπισθεν τὰ σπαρτία· καὶ γὰρ ταῦτα ἀφεθέντων τῶν σπαρτίων εὐθὺς πεπτώκασιν ὕπτια.

Διὰ τί οἱ γεγυμνασμένοι δυσριγότεροι τῶν 10 ἀγυμνάστων; πότερον ὅτι τὸ πῖον ὑπὸ τῶν πόνων ἐξήρηται, τοῦτο δὲ ἀλέαν παρέχει· θερμὸν γὰρ τὸ λιπαρόν. ἢ ὅτι εὐπνούστερα τὰ σώματα καὶ ἀραιότερα διὰ τὸ τὸ πῖον καὶ τὸ περίττωμα ἐξηρησθαι, ὥστε οὐδὲν ἀποστέγειν τὸ ψῦχος; ἢ διὰ τὴν τῶν πόρων ἀποστόμωσιν τοῖς ἰδρῶσιν οἷον
 25 πολλαὶ θύραι ἐξηρηνται; φανερόν δὲ ὅτι οὐχ ἢ αὐτὴ ἕξις πρὸς ὑγείαν καὶ ἰσχὺν συμφέρει· ἢ μὲν (γὰρ) πίων, ἢ δὲ ἀραιὰ φαίνεται οὕσα.

Διὰ τί φρίττουσι καὶ τῷ θερμῷ καὶ τῷ ψυχρῷ 11 προσχεόμενοι; ἄτοπον γὰρ τὰ ἐναντία τοῦ αὐτοῦ εἶναι αἷτια. ἢ διότι ὑπὸ μὲν τοῦ ψυχροῦ προσχεομένοις² τὸ ἐντὸς θερμὸν σβεννύμενον ποιεῖ τὴν
 35 φρίκην, ὑπὸ δὲ τοῦ θερμοῦ τὸ ἐκτὸς ψυχρὸν ἀντιπεριστάμενον εἰς ἓν καὶ ἀθροιζόμενον τῇ φυγῇ ἔσω; ὥστε ὑπὸ τοῦ αὐτοῦ ἄμφω γίνεται, ἀλλ' ὅτε μὲν ὑπὸ τοῦ ἔσω, ὅτε δὲ ὑπὸ τοῦ ἔξωθεν.

Διὰ τί φρίττουσιν αἱ τρίχες ἐν τῷ δέρματι; ἢ 12 ὅταν συσπάσῃ τὸ δέρμα, εἰκότως ἐξανέστησαν; 40 συσπῶσι δὲ καὶ ὑπὸ ρίγους καὶ ὑπ' ἄλλων παθῶν.

184 ¹ ἀφεθέντες Richards : ἀφέντες Ruelle.

² προσχεόμενοι Forster : προσχεόμενοι Ruelle.

PROBLEMS, VIII. 9-12

they are freed from danger, they at once become as before, so also with those who are ravenously hungry, if they take even a little bread, (because they have been violently removed from their normal condition, but have not been destroyed,) their recovery is rapid. For the same thing resists the natural tendency and restores us to our normal state. It is only necessary, therefore, to remove the cause, just like children who strain ropes in opposite directions, for as soon as the rope is let go they straightway fall on their backs.

Why are the highly trained less able to resist cold 10 than the untrained? Is it because fat is removed by exercise, and it is fat which produces heat? For that which is oily is warm. Or is it because bodies are more aired and rarer, because the fat and waste product have been removed, so that there is nothing to keep off the cold? Or is it due to the opening of the channels by sweat, as if many doors had been removed? Then it is evident that the same condition is not beneficial both to health and strength, for the former requires fat, but the latter is evidently thin.

Why do men shiver when either hot or cold water 11 is poured over them? For it is strange that contrary things should be productive of the same result. Is it because, when cold water is poured over them, the quenching of the internal heat produces shivering, but by hot water the external cold is checked and forced to one place in its flight within? So that the two effects are results of the same cause, but in the one case it is due to the inside and in the other to the outside.

Why do the hairs bristle on the skin? Is it because, 12 when the skin contracts, they naturally stand up? And the skin contracts under the influence of chill and other conditions.

888 b Διὰ τί ἐν τῇ τελευταίᾳ προέσει τοῦ οὐρου φρίτ- 13
τομεν; ἢ ὅτι ἐνότος μὲν τοῦ ὑγροῦ θερμοῦ
πλήρεις ἢ τε κύστις καὶ οἱ περὶ αὐτὴν πόροι,
ἐξελθόντος δὲ ἀέρος ψυχροῦ ἐνέπλησεν; οὐδὲν γὰρ
5 κενὸν δεῖ εἶναι, ἀλλ' ἢ ἀέρος ἢ σώματος πλήρες.
ἄτε οὖν εἰσεληλυθὸς ψυχροῦ ἀέρος εἰκότως
φρίττειν συμβαίνει.

Διὰ τί τῶν ριγόντων ἢ γλῶττα, καθάπερ τῶν 14
μεθυόντων, πταίει; πότερον ὑπὸ τοῦ ψύχους
πηγνυμένη καὶ σκληρυνομένη δυσκίνητος γίνεται,
10 τούτου δὲ συμβαίνοντος οὐ δύναται σαφηνίζειν;
ἢ τῶν ἐκτὸς πυκνουμένων διὰ τὸ ψῦχος εἴσω συρ-
ρυνὲν τὸ ὑγρὸν ἐξυγραίνει τὴν γλῶτταν, διόπερ οὐ
δύναται ἢ γλῶττα τὸ αὐτῆς ποιεῖν, καθάπερ
εἴρηται καὶ ἐπὶ τῶν μεθυόντων. ἢ διὰ τὸν ἀπὸ
τοῦ ρίγους τρόμον ἀτάκτου τῆς κινήσεως οὔσης
15 οὐ δύναται τὰ λεγόμενα διαρθροῦν ἢ γλῶττα·
διόπερ καὶ πταίει;

Διὰ τί τῶν ριγόντων ὀρθαὶ αἰ ἐν τῷ σώματι 15
τρίχες γίνονται; ἢ διότι ἀπὸ τῆς καταψύξεως τὸ
θερμὸν εἰς τὸν ἐντὸς τόπον ἀθροίζεται, ἐκλείποντος
δ' ἐκ τῆς σαρκὸς τοῦ θερμοῦ συνίσταται μᾶλλον,
20 συναγομένης δὲ ὀρθότεραι αἰ τρίχες γίνονται; ἢ
διότι * * *

Διὰ τί τοῦ χειμῶνος τρέχοντες μᾶλλον ριγῶμεν 16
ἢ ἐστῶτες; ἢ ὅτι ὁ ἀῆρ ὁ περὶ τὸ σῶμα ἐστῶτων
μὲν, ἐπειδὴν ἅπαξ συνθερμανθῆ, οὐκέτι ἐνοχλεῖ,
τρέχόντων δὲ αἰεὶ ἄλλος καὶ ἄλλος προσπίπτει
25 ψυχρὸς ὢν, διόπερ μᾶλλον ριγῶμεν; ἔτι δὲ καὶ

PROBLEMS, VIII. 13-16

Why do we shiver at the end of an emission of 13 urine? Is it because, while there is moisture within, the bladder and the channels about it are full of warmth, but when it has passed out they fill up with cold air? For nothing can be empty but is full either of air or of something corporeal. So when the cold air has entered it is natural that we should shiver.

Why does the tongue of men who are chilled 14 stumble like that of a drunkard? Is it because it becomes congealed and hardened by cold and so is difficult to move, and when this occurs it cannot articulate clearly? Or is it because, when the outward parts thicken through cold, the moisture collects and soaks the tongue, wherefore the tongue cannot perform its own proper function, as has been said in the case of drunkards? ^a Or is it because the movement becomes uncontrolled owing to the trembling due to the cold, so that the tongue cannot articulate what it says; consequently it stumbles?

Why do the hairs on the bodies of those who are 15 chilled stand up straight? Is it because as a result of cooling the heat collects into the part within, and when the heat leaves the flesh it becomes more solid, and as it is drawn together the hairs stand more on end? Or is it because . . . ^b

Why do we get colder in the winter if we run than 16 if we stand still? Is it because the air which surrounds the body when one is standing, once it has been warmed, causes no discomfort, but when we run fresh air continually meets us which is cold, and for this reason we get more chilled when running? Moreover

^a Cf. Bk. III. 31.

^b The rest of this problem is missing from the mss.

888 b κινούμενος ψυχρότερος γίνεται ὁ ἀήρ· τοῦτο δὲ ἐν τῷ τρέχειν μάλιστα συμπίπτει.

Διὰ τί ὑποφαύσκοντος μᾶλλον ψῦχος [ἢ] ἐγγυτέρω τοῦ ἡλίου ὄντος; ἢ ὅτι πλείων <ὁ> 17 χρόνος τῆς τοῦ ἡλίου ἀπουσίας, ὥστε μᾶλλον ἀπέψυκται ἢ γῆ; ἢ ὅτι πρὸς ἡμέραν ἢ δρόσος 30 πίπτει ὥσπερ πάχνη, ταῦτα δὲ ψυχρά; ἢ καὶ ταῦτα πίπτει διὰ τὸ κρατεῖσθαι τὸ ἀναφερόμενον θερμόν, κρατεῖται δὲ διὰ τὴν τοῦ ἡλίου ἀπουσίαν· διὸ καὶ πλείον μὲν ἀπέχοντος οὐ πίπτει, ἐγγυτέρω δὲ ὄντος πίπτει καὶ πήγνυται· διότι μᾶλλον ἀπ- 35 ἐψυκται ὁ τόπος, πλείω χρόνον τοῦ ἡλίου ἀπόντος. ἢ ὅτι πρὸς ἡμέραν μᾶλλον τὰ ἐκ νυκτῶν πνεύματα αἴτια¹ τῆς ψύξεως; ἢ ἡμῖν δοκεῖ μᾶλλον εἶναι ψῦχος διὰ τὸ πεπέφθαι τὰ σιτία; κενώτεροι δὲ ὄντες δυσριγότεροι. σημεῖον δὲ τὸ μετὰ τοὺς ἐμέτους μάλιστα ριγᾶν.

Διὰ τί πονοῦσιν, ὅταν ριγῶντας πρὸς τὸ πῦρ 18 φέρωσιν· ὅταν δὲ κατὰ μικρὸν χλιαίνωσιν, οὐ; ἢ 40 ὅτι ὄλως ἐκ τῶν ἐναντίων τοῦναντίον γινόμενον μεγάλην ποιεῖ τὴν μεταβολήν; ὥσπερ ἐπὶ τῶν δένδρων, εἰ μὲν κατὰ μικρὸν κάμπτοι τις, οὐκ ἂν πονοῖ, εἰ δὲ σφοδρότερον καὶ μὴ κατὰ μικρόν, κλῶνται. εἰ οὖν τὸ ὅμοιον ὑπὸ τοῦ ὁμοίου ἀπαθές, 5 τὸ δὲ θερμόν τοῦ ριγῶντος εἴσω συνίσταται καὶ συνέρχεται, τὸ δὲ ὑγρὸν καταλείπεται καὶ τὸ ψυχρόν, τὸ δὲ ἐναντίον τοῦ ἐναντίου φθαρτικόν· ὥστε εἰ μὲν χλιαίνῃ, κατὰ μικρὸν ἐξέρχεται τὸ θερμόν καὶ ἥττον πονεῖ, εἰ μὴ ἀναχλιάνῃ, προσάγει μᾶλλον.

¹ αἴτια inserted by Richards.

PROBLEMS, VIII. 16-18

the air becomes colder when it is moved ; and it is this for the most part which meets us in running.

Why is it colder at dawn, although the sun is nearer 17 then ? Is it because at that moment the sun has been absent for a long time, so that the earth has been more chilled ? Or is it because dew, like hoarfrost, falls more towards daybreak, and these are both cold ? Or do both these fall because the rising heat is mastered, and it is mastered because of the absence of sun ? When the sun is farther away, they do not fall, but when it is nearer they fall and harden, because the place grows colder the longer the sun has been away. Or are the night breezes at daybreak the cause of the chilling ? Or do we only think that the cold is greater because then the food in us is digested ? We are then more liable to cold because we are more empty. Evidence for this is the fact that we are coldest after vomiting.

Why do men feel pain when they are brought cold 18 to the fire ? When they are warmed gradually, they feel no pain. Is it because, as a general rule, one extreme following another produces a great change ? Just as with trees, if one bends them little by little, they will not suffer, but if it be done more violently and not by degrees, they break. If, then, like is unaffected by like, the heat of the chilled man congeals and collects within, and the wet and cold is left behind, and contraries are destroyed by contraries ; so, if one warms the man, the heat comes out little by little and causes less pain, but if one does not warm the man gradually, it adds to his pain.

10 Διὰ τί ψυχθέντες μάλλον ἀπὸ τῆς αὐτῆς θερ- 19
μασίας καιόμεθα καὶ ἀλγοῦμεν; πότερον διὰ
πυκνότητα στέγει ἢ σὰρξ τὸ προσπίπτον θερμόν;
διὸ μόλιβος ἐρίου θερμότερος. ἢ βίαιος γίνεται
τοῦ θερμοῦ ἢ δίοδος διὰ τὸ πεπηγέναι ὑπὸ τοῦ
ψύχους τοὺς πόρους.

15 Διὰ τί οἱ ὀργιζόμενοι οὐ ριγῶσιν; ἢ ὅτι ἡ ὀργή 20
τῆ δειλία ἐναντίον καὶ ὁ θυμός; ἔστι δὲ ἡ μὲν
ὀργή ἀπὸ τοῦ πυρός· πολὺ γὰρ τὸ πῦρ κατέχοντες
εἴσω χλιαίνονται. μάλιστα δ' ἔστιν ἐπὶ τῶν
παιδίων καταμαθεῖν. οἱ μὲν γὰρ ἄνδρες βλάπ-
τονται, τὰ δὲ παιδιά πρῶτον μὲν τὸ πνεῦμα πολὺ
20 ἀναλαμβάνουσιν, εἶτα ἐρυθριῶσιν· πολὺ γὰρ εἴσω
ὄν τὸ θερμόν· καὶ ἐξυγραῖνον ἐρυθριᾶν ποιεῖ, ἐπεὶ
εἴ τις αὐτοῖς πολὺ τοῦ ψυχροῦ προσχέοι, παύσαιντ'¹
ἂν ὀργιζόμενοι· κατασβεσθεῖη γὰρ ἂν αὐτῶν τὸ
θερμόν. οἱ δὲ δειλοὶ καὶ φοβούμενοι τοῦναντίον.
ριγῶσίν τε γὰρ καὶ ψυχροὶ καὶ ὠχροὶ γίνονται·
25 ἐκλείπει γὰρ τὸ θερμόν αὐτοῖς ἐκ τῶν ἐπιπολῆς
τόπων.

Διὰ τί, ὅταν φρίξωμεν, αἱ τρίχες ὀρθαὶ ἴστανται; 21
ἢ διὰ τὸ ἐν ὑγρῷ πεφυκέναι κατακεκλίσθαι;
κρατεῖ γὰρ τοῦ ὑγροῦ τὸ βάρος² τῆς τριχός. ἢ δὲ
φρίκη γίνεται ὑπὸ τοῦ ψυχροῦ, τὸ δὲ ψῦχος κατὰ
30 φύσιν πήγνυσι τὸ ὑγρόν. ὅταν οὖν μεταβάλλῃ τὸ
ὑγρόν, ἐξ οὗ πεφύκασιν αἱ τρίχες, καὶ παγῆ, μετα-
βάλλειν εἰκὸς καὶ τὰς τρίχας. εἰς μὲν οὖν τοῦ-
ναντίον εἰ μεταβάλλουσιν, ἢ ἐν ταύτῳ μένουσιν,
ἢ ἐπικρατήσῃ πάλιν ἡ θριξ τοῦ ὑγροῦ· οὐκ εἰκὸς
δὲ πεπηγότος καὶ πεπυκνωμένου τοῦ ὑγροῦ τὴν
35 τρίχα τῷ βάρει κρατεῖν. εἰ δὲ μηδαμῶσε κεκλίσθαι
δυνατὸν τὴν τρίχα τῷ τὸ ὑγρὸν πεπηγέναι, λείπεται

PROBLEMS, VIII. 19-21

Why do we burn and suffer more by the same heat 19 if we have first been chilled? Does the flesh by its density keep off the heat which falls on it? This is why lead becomes hotter than wool. Or is the passage of the heat violent because the pores are hardened by the cold?

Why do not men who are angry become cold? Is 20 it because anger and wrath are the opposite of cowardice? Now anger is due to fire, for it is by retaining a quantity of fire that they grow hot within. One can notice this most in children. For men are distressed, but children first of all draw deep breaths and then grow red; for the amount of heat within being great and causing liquefaction makes them grow red, since if anyone were to pour abundant cold water over them they would cease to be angry, for their heat would be quenched. But cowards and men afraid are just the opposite. For they grow chilled, cold and pale, for the heat fades from the parts on the surface.

Why, when we shiver, do the hairs stand up 21 straight? Is it because they naturally lie down in moisture? For the weight of the hair is too great for the moisture. But shivering comes from the cold, and cold naturally congeals the moisture. When, then, the moisture, from which the hairs grow, changes and congeals, it is natural for the hair to change too. If, then, the change is to an opposite condition, either the hairs remain in the same state or the hair will again master the moisture. But it is not likely that, when the moisture is hardened and thickened, the hair should gain the mastery by its weight. If, then, the hair cannot lie down anywhere because the moisture is congealed, it can only stand up straight.

² βάρος Bonitz : βάθος Ruelle.

889^a ἐστάναι ὀρθήν. ἢ διότι ὑπὸ τῆς καταψύξεως τὸ
 θερμὸν εἰς τὸν ἐντὸς τόπον ἀθροίζεται, ἐκλείποντος
 δὲ ἐκ τῆς σαρκὸς τοῦ θερμοῦ συνίσταται μᾶλλον ἢ
 σὰρξ, συναγομένης δὲ ὀρθότεραι αἱ τρίχες γίνονται,
 889^b καθάπερ εἰάν τις εἰς τὴν γῆν ἐμπήξας κάρφος ἢ
 ἄλλο τι συσάπτη καὶ πάντοθεν συνάγη τὴν γῆν,
 μᾶλλον ὀρθοῦται ἢ εἰάν τις μὴ συνεστηκυῖαν.

Διὰ τί οἱ ῥιγῶντες μάλιστα οὐ καθεύδουσιν; ἢ 22
 5 διότι ὁ ῥιγῶν μᾶλλον κατέχει τὸ πνεῦμα ἢ ἐκπνεῖ,
 ὁ δὲ καθεύδων ἐκπνεῖ ἢ εἰσπνεῖ; ἐναντίως οὖν
 ποιεῖ ἔχειν τὸ ῥίγος τῷ καθεύδειν.

PROBLEMS, VIII. 21-22

Or is it because the heat is collected by the chilling into the inner region, and when the warmth fades from the flesh the flesh becomes firmer, and as it is drawn together the hairs become erect, just as if one were to fasten a twig or something of the kind into the ground and earth it up with soil collected from all sides, it would stand more erect than if one left the soil loose round it ?

Why cannot those who are very cold sleep ? Is it 22 because the chilled man retains his breath rather than exhales, but the man asleep exhales more than he inhales ? Consequently cold acts in a contrary way to sleep.

ΟΣΑ ΠΕΡΙ ΥΠΩΠΙΑ ΚΑΙ ΟΥΛΑΣ ΚΑΙ
ΜΩΛΩΠΑΣ

889 b

10 Διὰ τί τοὺς μώλωπας κωλύει τὰ νεόδαρτα 1
δέρματα προστιθέμενα, καὶ μάλιστα κριῶν, καὶ
ὡὰ ἐπικαταγνύμενα; ἢ ὅτι ἄμφω κωλύει τὴν
ἄθροισιν τοῦ ὑγροῦ καὶ τὴν ἔπαρσιν; τὸ γὰρ
ἀφηλκωμένον ἔλκει τὸ ὑγρὸν καὶ¹ ἐπαίρεται διὰ τὴν
θερμασίαν· τά τε δὴ ὡὰ διὰ τὴν γλισχρότητα
15 κατακολλῶντα κωλύει ἐπαίρεσθαι, καθάπερ καὶ
τὰ καύματα, ὥσπερ καὶ ἡ κόλλα, καὶ τὰ δέρματα
τῇ τε γλισχρότητι προσκολλᾶται, καὶ ἅμα τῇ
θερμότητι συμπέττει καὶ παύει τὴν φλεγμασίαν·
οὐδὲ γὰρ ἀφαιροῦσιν ἡμερῶν τινῶν. ἐξάγειν δὲ
βούλονται τὴν φλεγμασίαν καὶ οἱ τῷ ἀλὶ καὶ τῷ
ὄξει τρίβοντες.

20 Διὰ τί ἐν μὲν τῷ ἄλλῳ σώματι αἱ οὐλαὶ μέλαιnai, 2
ἐν δὲ τῷ ὀφθαλμῷ λευκαί; ἢ ὅτι ἐναντίαν χροάν
ἢ οὐλήν λαμβάνει τῇ πρότερον, ὥσπερ πᾶν τὸ
νενοσηκός; ἐν τῷ μέλανι δὲ τοῦ ὀφθαλμοῦ τὰ
ἔλκη. οὐ μὲν οὐδὲ ἐν τῷ σώματι μέλαιnai εὐθύς,
25 ἀλλ' ἐξ ἀρχῆς λευκαί,² οὐδὲ ἐν τῷ ὀφθαλμῷ αἰεὶ
λευκαί, ἀλλ' ἀποκαθίστανται τῷ χρόνῳ, ἢ ἀπλῶς
ἢ εἰς τὸ μάλλον.

Διὰ τί ὁ νάρθηξ τὰ κύκλω τῆς πληγῆς ποιεῖ 3

BOOK IX

ON BRUISES, SCARS AND WEALS

Why are weals prevented by the application of ¹ newly-skinned hides, especially rams' hides, and by broken eggs? Is it because both prevent the collection of moisture and the swelling? For the wounded part draws the moisture and swells owing to inflammation. Eggs, because of their viscosity, coagulate and prevent the swelling (as in cauterization), like glue. Skins adhere by their viscosity, cause concoction by heat, and stop inflammation; and they do not remove them for several days. Those who rub in salt and vinegar are also trying to draw out the inflammation.

Why are scars black on other parts of the body, but ² white on the eye? Is it because a scar assumes the opposite of its former colour, as every diseased condition does? Scars occur in the black part of the eye. They do not become black immediately even on the body, but are white to begin with, nor are they always white in the eye, but they change after a time, either entirely or to a considerable extent.

Why does a blow with fennel make a red circle ³

¹ τὸ ὑγρὸν καὶ inserted by Forster.

² λευκαί Bonitz : μέλαινα Ruelle.

889^b ἐρυθρά, τὸ δὲ μέσον λευκόν; πότερον ὅτι ἀπο-
πιέζει τὸ αἷμα ἐκ τοῦ μέσου, καθὸ μάλιστα προσ-
30 πίπτει περιφερῆς ὢν; ἢ ἔδει ἐπανιέναι διὰ γε
τοῦτο πάλιν· ἀλλ' αἵματος συνδρομὴ τὸ ἐρύθημά
ἐστίν, συνδρομὴ δ' εἰς τὸν πληγέντα τόπον.

Διὰ τί τῷ μὲν νάρθηκι σφόδρα τυπτόμενον τὸ 4
μέσον τῆς σαρκὸς λευκὸν γίνεται, τὸ κύκλῳ δὲ
ἐρυθρόν, ξύλῳ δὲ ἐρυθρότερον τὸ μέσον; ἢ ὅτι ὁ
35 μὲν νάρθηξ διὰ κουφότητα, εἰς σφόδρα πατάξῃ,
τὸ ἐπιπολῆς διεσκέδασεν αἷμα, ὥστε ὅθεν μὲν
ἐξέλιπεν, λευκὸν φαίνεται, οὗ δὲ πλεόν ἦλθεν, ἐρυ-
θρότερον. οἰδησάσης δὲ τῆς πληγῆς, οὐ ταχέως
ἀποκαθίσταται τὸ σκεδασθὲν αἷμα διὰ τὸ ὀλίγον τε
εἶναι καὶ τὴν φορὰν εἰς τὸ πρόσαντες εἶναι· πλήθει
890^a γὰρ βιασθὲν δεῖ τὴν παρὰ φύσιν φορὰν ἐνεχθῆναι.
διὰ δὲ τῶν σκληρῶν αἰ πληγαὶ διὰ τὸ βάρος καὶ
τὴν ἰσχὺν θλίψιν καὶ θλάσιν ποιούσιν. θλιβόμενον
μὲν οὖν κοῖλον γίνεται, θλώμενον δὲ ἀραιόν· τομῇ
5 γὰρ καὶ διαίρεσις ἐστὶ μαλακῆ ἢ θλάσις. κοίλου
δὲ καὶ ἀραιοῦ γενομένου τοῦ μέσου, φέρεται εἰς
αὐτὸ ἐκ τῶν πέριξ ἐπιπολῆς αἷμα· κάτω τε γὰρ
πέφυκε φέρεσθαι, καὶ εἰς τὰ ἀραιὰ τῷ εἴκειν αὐτά.
ἀθροισμένου δ' ἐνταῦθα εἰκότως τοῦ αἵματος τοῦτο
μὲν ἐρυθραίνει, ἃ δὲ ἀπολείπει, λευκαίνει.

10 Διὰ τί αἰ οὐλαὶ μέλαιναί τῶν σπληνιῶντων; ἢ 5
ὅτι αἷμα διεφθαρμένον ἔχουσιν διὰ τὴν ἐκ τοῦ
σπληνὸς σύμμειξιν νοσώδους αἵματος καὶ ὕδαρου;
ἢ μὲν οὖν οὐλὴ τὸ δέρμα λεπτὸν καὶ ἐπιπόλαιον
ἴσχει· τὸ δὲ αἷμα, διὰ τὸ ὕδαρὲς καὶ θερμὸν εἶναι

round the area of the blow, with a white centre? Is it because it forces the blood out of the centre, where its pressure is greatest because it is circular? Or should it not return to the same spot, while the redness is due to the rush of blood, and the rush of blood is towards the wounded part.

Why when violently struck with fennel does the ⁴ middle of the flesh become white, with a red circle round it, but when struck with wood, the centre is more red? Is it because the fennel owing to its lightness, if the blow is considerable, scatters the blood on the surface, so that the part from which it is withdrawn looks white, but where more has come looks more red? As the struck part swells, the blood which has been scattered does not return quickly, because there is not much of it, and its course is in an upward direction; for a course in an unnatural direction is only possible when force is imparted by mass. But blows dealt by hard objects owing to their weight and strength produce pressure and a crushing effect. So under the pressure a hollow is produced, and when crushed the part becomes rare; for crushing is a mild form of cutting and division. When the centre has become hollow and rare, the blood is carried to it from the surface around it; it is natural for it to travel downwards and to the rare parts because they yield to it. When then the blood collects in that spot, it naturally makes it red, but the parts from which it retires turn white.

Why are the scars of the splenetic black? Is it ⁵ because their blood is corrupted owing to the mixture of diseased and watery blood from the spleen? Now the scar has a thin and superficial skin; but the blood, which is black because it is watery and warm,

890 a
 15 μέλαν ὄν, τοιαύτην ποιεῖ τὴν οὐλὴν διαφαινόμενον·
 καὶ δὴ πλεονάκεις ἢ οὐλὴ ἐν τούτῳ γίνεται μελαν-
 τέρα. γίνεται δὲ διὰ ταυτό· δι' ἀσθένειαν γὰρ τοῦ
 δέρματος καταψύχεται τὸ αἷμα, καὶ ἐξατμίζοντος
 τοῦ θερμοῦ γίνεται μελάντερον. ὁμοίως δὲ καὶ
 τοῖς πρεσβύταις οἷ τε χρώτες μελάντεροι γίνονται,
 20 καὶ αἱ οὐλαὶ αἱ συγγενεῖς μελάντεραι ἢ νέοις· οἷον
 ὑπόπιον γὰρ αὐτοῖς ἅπαν τὸ σῶμα οὐ διὰ λεπτότητα
 τοῦ δέρματος, ἀλλ' ὅτι τὸ θερμὸν ἐκλέλοιπεν.

Πότερον ὅσα τοῦ αὐτοῦ αἷτια τὴν αὐτὴν ἔχει 6
 δύναμιν εἰς τὸ ποιεῖν, ἢ οὐ; λέγω δὲ οἷον ἐπεὶ τὰ
 25 ὑπόπια καὶ ὁ χαλκὸς ἐξαίρει καὶ ἡ ῥαφανὶς καὶ ὁ
 κύαμος διαμασώμενος καὶ ὁ πνεύμων καὶ ἡ ἄργιλος
 καὶ ἕτερ' ἄττα, τῇ αὐτῇ δυνάμει, ἢ ὁ μὲν χαλκὸς
 τῷ ἰὸν εἶναι, τὸν δὲ ἰὸν φαρμακώδη, ὁ δὲ κύαμος
 καὶ ὁ πνεύμων καὶ ἡ ἄργιλος τῷ ἐπισπᾶν ἐφ' αὐτὰ
 30 διὰ μανότητα, ἀλλὰ δὲ δι' ἑτέρας αἰτίας; ἢ τὸ
 μὲν ἔσχατον ἐπὶ πάντων τῶν τοιούτων ταυτό
 (πολλὰ γὰρ καὶ ἐναντία τούτοις, καθάπερ καὶ τὸ
 θερμὸν καὶ τὸ ψυχρόν), τὰ δὲ πρὸ τούτων οὐδὲν
 κωλύει ἕτερα.

Διὰ τί αἱ μὲν ἄλλαι οὐλαὶ μέλαιναι γίνονται, αἱ 7
 δὲ ἐν τῷ ὀφθαλμῷ λευκαί; ἢ διότι μεταβάλλουσιν
 35 ἐν ᾧ ἂν ὦσι πρὸς τὰς χροιάς, ἐν δὲ τῷ ὀφθαλμῷ
 μέλανι ὄντι γίνονται, ὥστε ἀνάγκη λευκὰς γίνεσθαι.

Διὰ τί ἀλγεινότερα ἢ πληγὴ τοῦ νάρθηκος ἢ 8
 ἐνίων σκληροτέρων, εἴαν τις κατὰ λόγον σκοπῇ
 τύπτων; εὐλογώτερον γὰρ τὴν τοῦ σκληροτέρου
 890 b εἶναι ἀλγεινότεραν· μάλλον γὰρ τύπτει. ἢ ὅτι ἢ
 σὰρξ ἀλγεί οὐ μόνον τυπτομένη, ἀλλὰ καὶ τύπ-
 τουσα; ὑπὸ μὲν οὖν τῶν σκληρῶν τύπτεται μόνον
 (ὑπεῖκει γὰρ διὰ τὴν σκληρότητα αὐτῶν), ὑπὸ δὲ

^a A marine animal supposed to possess curative powers.

PROBLEMS, IX. 5-8

causes a scar of the same kind by showing through ; and as a general rule the scar in such a part becomes blacker and blacker. This happens for the same reason, for the blood is chilled through the weakness of the skin, and becomes blacker as the heat vaporizes. In the same way skins become darker with old men, and congenital scars are darker than with young men : for their whole body becomes like a bruise not because of the thinness of the skin, but because the warmth has failed.

Do all things which cause the same effect have the 6 same capacity for producing it or not ? For instance I mean copper, radish, pounded beans, "lungs" ^a and clay and other things all remove bruises. Do they all do it by the same quality or does copper do so because it rusts, and rust is curative, and beans, "lungs," and clay because they draw towards themselves owing to their porous nature, and other things for other reasons ? Or is the final effect in every case the same (for they have many opposite qualities among them, such as heat and cold) but there is nothing to prevent the earlier effects from being different ?

Why are other scars black, but those in the eye 7 white ? Is it because scars change in relation to colours according to where they occur, so that those which occur in the eye, which is black, must of necessity be white ?

Why is a blow from a fennel stalk more painful than 8 some harder blows, if in striking one calculates the force used ? For it would be more reasonable that the blow of the harder should be more painful, for it strikes more heavily. Is it because the flesh is pained not only when being struck, but also when striking ? By hard things it is only struck (for it gives way owing to their hardness), but when a fennel stalk is

890 b τοῦ νάρθηκος ἄμφω αὐτῇ συμβαίνει, τύπτεσθαι
 5 τε καὶ διὰ κουφότητα τοῦ βάρους τύπτειν μὴ
 εἴκουσαν, ὥστε διπλασία γίνεται ἢ πληγῇ.

Διὰ τί ἡ θαψία καὶ ὁ κύαθος τὰ ὑπώπια παύει, 9
 ἢ μὲν ἀρχόμενα, ὁ δὲ ὕστερον, ἐναντία ὄντα; ὁ
 μὲν γὰρ κύαθος ψυχρός, ὥσπερ καὶ ὁ ποιητής φησι
 10 “ψυχρὸν δ’ ἔλε χαλκὸν ὁδοῦσιν,” ἢ δὲ θαψία
 θερμὸν καὶ καυστικόν. ἢ ὁ μὲν κύαθος ὥσπερ τοῖς
 μικροψυχοῦσι τὸ ὕδωρ; ἀπαντῶσα γὰρ ἡ ψύξις
 κωλύει ἐξιέναι τὸ θερμὸν ἐκ τοῦ αἵματος ἐξ ἐπι-
 15 πολῆς διὰ τὴν πληγὴν συνδραμόντος, καὶ ὅταν
 ἐξέλθῃ τὸ θερμόν, πηγνυμένου. ὥσπερ γὰρ ἂν εἰ
 ἔξω ὄν πήγνυται, καὶ ἐγγὺς τοῦ ἔξω τὸ αἷμα, ὅταν
 ἢ ὑπὸ τὸ δέρμα, κωλυθέντος δὲ ἐξιέναι¹ τοῦ θερμοῦ,
 διὰ τὴν ψυχρότητα τοῦ χαλκοῦ (οὐ) πήγνυται,
 ἀλλὰ πάλιν διαχεῖται καὶ ἐπανέρχεται ὅθεν συν-
 ἔδραμεν. ἢ δὲ θαψία θερμὴ οὖσα τὸ αὐτὸ ποιεῖ.
 κωλύει γὰρ πήγνυσθαι θερμὴ οὖσα.

20 Διὰ τί τὰ ὑπώπια διαλύεται προσέχουσιν τὰ 10
 χαλκᾶ, οἷον κυάθους καὶ τὰ τοιαῦτα; ἢ διότι
 ψυχρὸν ὁ χαλκός ἐστιν; κωλύει οὖν τὸ θερμὸν
 ἐξιέναι ἐκ τοῦ συνιόντος αἵματος ὑπὸ τῆς πληγῆς,
 οὐ ἐξελθόντος ἐκ τοῦ ἐπιπολῆς γίνεται ὑπώπιον.
 διὸ καὶ ταχὺ δεῖ προστιθέναι πρὶν παγῆναι. καὶ ἢ
 25 θαψία δὲ μετὰ μέλιτος βοηθεῖ διὰ τὸ αὐτό. θερμὴ
 γὰρ οὖσα κωλύει ψύχεσθαι τὸ αἷμα.

Διὰ τί ποτε, ὅταν ἐν τῷ αὐτῷ τόπῳ πλεονάκεις 11
 ἔλκος γένηται, ἢ οὐλὴ μέλαινα γίνεται; ἢ ὅποταν
 γένηται ἔλκος, πᾶν ἀσθενές ἐστὶν τοῦτο, καὶ ὅσω
 30 ἂν πλεονάκεις, τοσοῦτω μᾶλλον. τὸ δὲ ἀσθενές

¹ δὲ ἐξιέναι Ross : διεξιέναι Ruelle.

^a Homer, *Iliad*, v. 75.

used, two effects are produced—it is both struck and it also strikes because it does not yield owing to the lightness of the weight ; so that the blow is double.

Why do both thapsia and the cupping-glass stop 9 bruises, the former at first and the latter at a later stage, seeing that they are contrary to each other? For the cupping-glass is cold, as the poet says “ he put cold bronze to his teeth,” ^a whereas thapsia is hot and caustic. Does the bronze cupping-glass act like water on the fainting? For the cold meets the heat and prevents it from leaving the blood on the surface to which it rushes owing to the blow, and when the heat comes out, the blood congeals. Just as if it congealed on the outside, so the blood congeals near the outside, when it is under the skin, and as the heat is prevented from escaping the blood does not congeal owing to the coldness of the bronze, but disperses again and returns to the area from which it collected. But thapsia being hot produces the same result ; for, because it is hot, it prevents the blood from congealing.

Why are bruises dispersed by the application of 10 bronze vessels such as cupping-glasses or the like? Is it because bronze is a cold metal? So it prevents the heat from withdrawing from the blood which collects owing to the blow, and when this withdraws from the surface a bruise results. So it must be applied quickly before congealing takes place. Thapsia mixed with honey helps in the same way, for being hot it prevents the blood from being chilled.

Why is it that when a wound has occurred more 11 than once in the same place, the scar becomes black? Is it because whenever a wound occurs, the whole spot is weak, and the more often this happens, the weaker

890 b

κατεψυγμένον καὶ ὑγρότητος πλήρες; διὸ καὶ μέλαν φαίνεται. εἶτα¹ μεγάλα ἔλκη καὶ πολυχρόνια μελαίνας τὰς οὐλὰς ἴσχει. τὸ δὲ πολλάκις λαβεῖν ἔλκος οὐδὲν ἄλλ' ἢ πολὺν χρόνον ἔχειν ἐστὶν ἔλκος.

Διὰ τί ποτε πρὸς τὰ ὑπώπια τοὺς κύαθους προσ- 12
35 τιθέμεθα; ἢ διότι, ὅταν πληγῶμεν, ὁ τόπος καταψύχεται, τὸ δὲ θερμὸν ὑποχωρεῖ; προστιθέμενος οὖν ὁ κύαθος, ψυχροῦ ὄντος τοῦ χαλκοῦ, διακωλύει τὸ θερμὸν ἐκπορεύεσθαι.

Διὰ τί ἐν ταῖς οὐλαῖς οὐ γίνονται τρίχες; ἢ ὅτι 13
οἱ πόροι ἐπιτυφλοῦνται ἐξ ὧν αἱ τρίχες, καὶ παραλλάττουσιν;

891 a Διὰ τί οἴδημα καὶ πελιώματα λαμβάνουσιν αἱ 14
πληγαί; ἢ διότι κατὰ τοῦτον τὸν τόπον διασταλέντα τὰ ὑγρά, εἰς τοὺς πλησίον τόπους προσκόψαντα ἀποπάλλεται πάλιν καὶ τῇ κολλήσει τῶν
5 ὑγρῶν συνήγαγεν; εἰ δὲ καὶ φλέβιά τινα ῥαγῇ, ὕφαιμος ἢ συνδρομὴ γίνεται.

¹ εἰ τὰ Ruelle.

PROBLEMS, IX. 11-14

it becomes ? Now the weak spot is chilled and full of moisture. Consequently it appears black. Again, large and old wounds have black scars, and to receive a wound many times is just the same as to have a wound for a long time.

Why do we apply bronze cupping-glasses to bruises ? 12 Is it because, when we receive a blow, the place is chilled, and the heat withdraws ? So the application of a bronze cupping-glass, as bronze is cold, prevents the heat from withdrawing.

Why do not hairs grow on bruises ? Is it because 13 the pores from which the hairs grow are obstructed and change position ?

Why do blows produce swelling and livid spots ? Is 14 it because in this region the moisture is dispersed, and after penetrating to the neighbouring parts recoils again, and collects by the adhesion of the moisture ? Also if any blood-vessels are broken, there is a collection of blood under the skin.

I

ΕΠΙΤΟΜΗ ΦΥΣΙΚΩΝ

891 a

Διὰ τί τὰ μὲν βήττει, τὰ δὲ οὐ, οἷον ἄνθρωπος 1
μὲν βήττει, βοῦς δὲ οὐ; πότερον τῷ εἰς ἄλλο τι
10 τρέπεσθαι τοῖς πλείστοις ζώοις τὸ περίπτωμα,
ἀνθρώπῳ δὲ δεῦρο; ἢ ὅτι ἐγκέφαλον πλείστον καὶ
ὑγρότατον ἔχει ὁ ἄνθρωπος, ἢ δὲ βῆξ καταρρέοντος
γίνεται φλέγματος;

Διὰ τί ἀνθρώπῳ μόνῳ τῶν ζώων αἷμα ρεῖ ἐκ τῶν 2
μυκτήρων; ἢ ὅτι ἐγκέφαλον ἔχει πλείστον καὶ
15 ὑγρότατον, ἀφ' οὗ αἱ φλέβες πληρούμεναι τοῦ
περιπτώματος διὰ τῶν πόρων προῖενται τὴν ρύσιν;
λεπτότερον γὰρ γίνεται τοῦ αἵματος τοῦ καθαροῦ
τὸ νοσερόν, τοῦτο δὲ ἐστὶ τὸ μιχθὲν τοῖς τοῦ ἐγ-
κεφάλου περιπτώμασιν, καὶ ἐστὶ καθάπερ ἰχώρ.

Διὰ τί τῶν ζώων τὰ μὲν ὑπὸ σάρκα, τὰ δὲ κατὰ 3
20 σάρκα πίονά ἐστιν, τὰ δὲ κατ' ἀμφοτέρα; ἢ ὅσων
μὲν πυκνὴ ἢ σάρξ, μεταξὺ τοῦ δέρματος καὶ τῆς
σαρκὸς συστέλλεται ἢ ἰκμὰς διὰ τὸ ταυτῆ¹ εἶναι [τὸ
δέρμα] ἀφεστός² φύσει· ἢ πεττομένη γίνεται πιμελή.
ὅσα δὲ ἀραιότεραν ἔχει τὴν σάρκα τό τε δέρμα
25 προσεστός,³ κατὰ σάρκα πίονα γίνεται. τὰ δὲ
ἀμφοτέρως ἔχοντα ἐπ' ἀμφοτέρα πιαίνεται.

Διὰ τί οἱ παῖδες καὶ αἱ γυναῖκες ἥττον ἔχουσι 4

¹ ταύτη Bekker : ταύτην Ruelle.

² ἀφεστός Bekker : ἀφεστὼς Ruelle.

³ προσεστός Bussemaker : προεστὼς Ruelle.

BOOK X

A SUMMARY OF PHYSICAL PROBLEMS

WHY do some living creatures cough while others 1 do not? For instance man coughs, but the ox does not. Is it because in most animals the waste product turns to another part, but in man mostly to this part? Or is it because man has the largest and moistest brain, and the cough is due to phlegm passing downwards?

Why is man the only living creature in whom blood 2 flows from the nostrils? Is it because he has the largest and moistest brain, from which the veins being filled with waste product project a stream through the channels? For the unhealthy blood (that is, blood mixed with the waste products of the brain) is thinner than clean blood, and is like ichor.^a

Why do some animals grow fat under the flesh, 3 some in the flesh and some in both places? In the case of those whose flesh is dense the moisture collects between the skin and the flesh, because the skin here is naturally loose; this moisture when concocted becomes fat. But those that have rarer flesh and tight skin, become fat in the flesh. Those in whom both conditions obtain become fat in both places.

Why do boys and women suffer less from white 4

^a Ichor is the watery liquid in the body always contrasted with blood.

891 a λεύκη τῶν ἀνδρῶν, καὶ τῶν μὲν γυναικῶν αἱ
 πρεσβύτιδες μᾶλλον; ἢ ὅτι ἡ λεύκη ἐστὶ πνεύματος
 ἕξοδος, ἔστι δὲ τὰ μὲν τῶν παίδων οὐκ εὐπνοα
 30 σώματα, ἀλλὰ πυκνά, καὶ τὰ τῶν γυναικῶν ἥττον
 ἢ τὰ τῶν ἀνδρῶν· εἰς τὰ καταμήνια γὰρ τρέπεται·
 δηλοῖ δὲ ἡ λειότης τὴν πυκνότητα τῆς σαρκός. τὰ
 δὲ τῶν πρεσβυτέρων καὶ τῶν γραιῶν εὐπνοα· μόνα
 γάρ, ὥσπερ τὰ παλαιὰ οἰκοδομήματα, διεστῶσαν
 ἔχει τὴν σύνθεσιν τῶν μορίων.

35 Διὰ τί ἄνθρωπος μόνον ἴσχει λεύκη; πότερον 5
 ὅτι λεπτοδερμότατον τῶν ζώων ἐστίν, ἅμα δὲ καὶ
 πνευματωδέστερον; σημεῖον δέ, ὅτι ἡ λεύκη ἐν
 τοῖς λεπτοδερμοτάτοις μάλιστα καὶ πρῶτον γίνεται
 891 b μέρεσιν. ἢ διὰ ταῦτά τε, καὶ ὅτι μόνον πολιοῦται
 τῶν ζώων; ἐν γὰρ ταῖς λεύκαις πολιαὶ γίνονται
 αἱ τρίχες, ὥστε ἀδύνατον ὅσα μὴ πολιοῦται λεύκη
 ἴσχειν.

Διὰ τί αἶγες μὲν καὶ πρόβατα ἀμέλγονται 6
 3 πλείστον γάλα, οὐ μέγιστον σῶμα ἔχοντα, ἄν-
 θρωπος δὲ καὶ βουῖς ἕλαττον ὡς κατὰ λόγον;
 πότερον ὅτι εἰς τὸ σῶμα ἀναλίσκεται, τοῖς δὲ
 ἄλλοις εἰς τὸ περίττωμα, τοῖς δὲ προβάτοις καὶ
 ταῖς αἰξὶ τὸ περιγινόμενον τοῦ περιπτώματος γάλα
 γίνεται πᾶν; ἢ ὅτι πολυτοκώτερά ἐστι τῶν
 10 μεγάλων, ὥστε πλείον σπᾶ περίττωμα διὰ τὸ
 πλείω τρέφειν; ἢ δι' ἀσθένειαν τῶν σωμάτων
 πλείον περίττωμα γίνεται κύουσιν αὐτοῖς; τὸ δὲ
 γάλα γίνεται ἐκ τοῦ περιπτώματος.

Διὰ τί τῶν ζώων τὰ μὲν, μεταβάλλοντα τὰ 7
 ὕδατα, μεταβάλλει τὰς χροῖας καὶ ὅμοια γίνεται
 15 τοῖς ἐκεῖ, οἷον αἶγες, τὰ δὲ οὐ, οἷον ἄνθρωποι;

PROBLEMS, X. 4-7

leprosy than men, and old women more than young ones? Is it because leprosy is an escape of breath, and the bodies of boys are not well ventilated but are dense, and those of women are less well ventilated than those of men? For the breath is diverted in the menses; and its smoothness shows the density of the flesh. But the bodies of older men and of old women are well aired; for they alone, like old buildings, have gaps in the construction of their parts.

Why is man the only creature which suffers from 5 leprosy? Is it because he is the thinnest skinned of all living creatures, and also rather full of breath? There is evidence in the fact that leprosy occurs most and first in the parts where the skin is thinnest. Or is there another reason, namely, that man alone of all animals turns grey? For in leprosy the hair grows grey, so that those creatures whose hair does not turn grey cannot have leprosy.

Why do goats and sheep give most milk, though 6 they have not the largest bodies, while human beings and cattle give less in proportion? Is it because with cattle it is expended on the body, and with man on waste product, whereas in sheep and goats what remains of the waste product becomes milk? Or is it because of the larger animals they have the greatest number of offspring, so that they draw off more waste product because they have more feeding to do? Or because of the weakness of their bodies do they have more waste product during gestation? And the milk comes from waste product.

Why do some animals when they change their 7 water also change colour and become assimilated to the colour of the animals in the new locality, for example, goats, but some, for instance men, do not?

891 b

καὶ ὅλως δὲ διὰ τί τὰ μὲν μεταβάλλει, τὰ δὲ οὐ,
οἶον κόραξ οὐ μεταβάλλει; ἢ ὧν μὲν οὐ κρατεῖ
ἢ φύσις τοῦ ὑγροῦ, ὥσπερ ἢ τῶν ὀρνέων (διὸ
καὶ κύστιν οὐκ ἔχει), οὐ μεταβάλλει; καὶ διὰ τί
20 οὐκ αὐτά, ἀλλὰ τὰ ἔκγονα μεταβάλλει; ἢ ὅτι
ἀσθενέστερα τὰ νέα τῶν γεννησάντων;

Διὰ τί τὰ ἄρσενα μείζω τῶν θηλειῶν ὡς ἐπίπαν
ἐστίν; πότερον ὅτι θερμότερα, τοῦτο δὲ αὐξη-
τικόν; ἢ ὅτι ὀλόκληρα, τὰ δὲ πεπήρωται; ἢ
ὅτι τὰ μὲν ἐν πολλῷ χρόνῳ τελειοῦται, τὰ δὲ
ἐν ὀλίγῳ;

25 Διὰ τί τὰ μὲν ταχυτόκα τῶν ζώων ἐστίν, τῶν
δὲ πολυχρόνιος ἢ κύησις; ἢ ὅτι τὰ μακροβιώτερα
βραδύτερον πέφυκεν τελειοῦσθαι; ἔστι δὲ βραδυ-
τόκα τὰ μακρόβια. οὐ μέντοι τὰ μάλιστα, οἶον
ἵππος ἀνθρώπου βραδυτοκώτερον μὲν, ὀλιγο-
30 χρονιώτερον δέ. τούτου δὲ αἴτιον ἢ σκληρότης
τῶν ὑστερῶν· ὥσπερ γὰρ ἢ ξηρὰ γῆ οὐ ταχὺ ἐκ-
τρέφει, οὕτω καὶ ἢ τοῦ ἵππου ὑστέρα.

Διὰ τί τοῖς ἄλλοις ζώοις τὰ ἔκγονα μᾶλλον τὰς
φύσεις ὁμοιοῦται ἢ τοῖς ἀνθρώποις; ἢ ὅτι ὁ μὲν
ἄνθρωπος πολλαχῶς διατίθεται τὴν ψυχὴν κατὰ
35 τὴν ὀμιλίαν, καθὼς δ' ἂν ὁ τε πατήρ καὶ ἢ μήτηρ
διατεθῶσιν, οὕτω ποικίλλεται καὶ τὰ τικτόμενα.
τὰ δὲ ἄλλα ζῶα τὰ μὲν πλείιστα πρὸς αὐτὸ τοῦτό
εἰσιν. ἔτι δὲ οὐ πληροῦται ὡς ἐπὶ τὸ πολὺ διὰ
ταύτην τὴν ἐπιθυμίαν.

892 a Διὰ τί οἱ λευκοὶ ἄνθρωποι καὶ ἵπποι ὡς ἐπὶ τὸ
πολὺ γλαυκοί; ἢ διότι τριῶν χρωμάτων ὄντων
τοῖς ὀμμασιν, μέλανος καὶ αἰγωποῦ καὶ γλαυκοῦ,
τῷ τοῦ σώματος χρώματι καὶ τὸ τοῦ ὀφθαλμοῦ
b χρῶμα ἀκολουθεῖ, τοῦτο δὲ ἐστὶ γλαυκότης.

And speaking generally why do some animals change colour, whereas others, such as crows, do not? Is it true that where the element of moisture does not predominate, as in birds (who, therefore, have no bladder), there is no change? Why again do they not themselves change, but their offspring does? Is it because the young are weaker than their parents?

Why are males, generally speaking, larger than females? Is it because they are warmer, and warmth causes more growth? Or is it because they are complete, whereas the female is imperfect? Or is it because the former take a long time to develop, the latter a short time?

Why do some animals bear young very quickly, while with others the gestation period is long? Is it because it is natural for the long-lived to come to maturity more slowly? And the long-lived are born slowly. This is not universally true; for instance the horse bears young more slowly than the man, but is shorter lived. The reason for this is the hardness of the womb; for just as dry ground cannot produce quickly, so also with the womb of the mare.

Why do the offspring of other animals resemble their parents more than is the case with men? Is it because at the time of association man is variously disposed, and the variations of the offspring depend on the dispositions of the father and mother. The other animals are mostly intent upon the sexual act, whereas human beings are not entirely absorbed in this desire. Further, owing to this avidity impregnation does not usually take place.

Why are fair men and white horses usually grey-eyed? Is it because since there are three possible colours, black, greenish and grey, the colour of the eye follows the complexion of the body, and this is inclined to greyness?

Διὰ τίνα αἰτίαν οἱ νάνοι γίνονται; ἔτι δὲ μάλλον 12
καθόλου, διὰ τί τὰ μὲν ὄλως μεγάλα, τὰ δὲ μικρά;
εἶτα οὕτω σκεπτέον. δύο δὴ τὰ αἴτια· ἢ γὰρ ὁ
τόπος ἢ ἡ τροφή. ὁ μὲν οὖν τόπος, εἴαν ἦ στενός,
10 ἢ δὲ τροφή, εἴαν ὀλίγη, ὥσπερ καὶ ἤδη γεγενημένων
πειρῶνται μικροποιεῖν, οἷον οἱ τὰ κυνίδια τρέφοντες
ἐν τοῖς ὀρτυγοτροφείοις. ὅσοις μὲν οὖν ὁ τόπος
αἴτιος, οὗτοι πυγμαῖοι γίνονται. τὰ μὲν γὰρ
πλάτη καὶ [τὰ] μήκη ἔχοντες γίνονται κατὰ τὸ
τῶν τεκόντων μέγεθος, μικροὶ δὲ ὄλως. τούτου
15 δὲ αἴτιον, ὅτι διὰ τὴν στενότητα τοῦ τόπου συγ-
κλώμεναι αἱ εὐθείαι καμπύλαι γίνονται. ὥσπερ
οὖν οἱ ἐπὶ τῶν καπηλείων γραφόμενοι μικροὶ μὲν
εἰσι, φαίνονται δ' ἔχοντες πλάτη καὶ βάθη, ὁμοίως
συμβαίνει καὶ τοῖς πυγμαίοις. ὅσοι δὲ διὰ τροφῆς
ἔνδειαν ἀτελεῖς γίνονται, οὗτοι καὶ παιδαριώδη τὰ
20 μέλη ἔχοντες φαίνονται. καὶ ἐνίους ἰδεῖν ἔστι
μικροὺς μὲν σφόδρα, συμμέτρους δέ, ὥσπερ τὰ
Μελιταῖα κυνίδια. αἴτιον δὲ ὅτι οὐχ ὡς ὁ τόπος
ἢ φύσις ποιεῖ.

Διὰ τί τῶν ζώων τὰ μὲν ἐξ ἀλλήλων γίνεται, τὰ 13
δὲ ἐκ τινων συγκρινομένων ὁμοίως τῆς ἐξ ἀρχῆς
25 γενέσεως αὐτοῖς ὑπαρξάσης; καθάπερ οἱ περὶ
φύσεως λέγοντες λέγουσιν καὶ τὴν ἐξ ἀρχῆς
γένεσιν τῶν ζώων γενέσθαι, διὰ τὰς μεταβολὰς
καὶ μετακινήσεις τοῦ κόσμου καὶ τοῦ παντὸς οὕτω
μεγάλας· καὶ νῦν εἴπερ μέλλει πάλιν ἔσεσθαι,
τοιαύτας τινὰς ὑπάρξαι δεῖ κινήσεις. ἢ μὲν γὰρ
80 ἀρχὴ παντὸς ἔργου μέγιστον· ἡμισυ γάρ. τὸ δὲ
σπέρμα ἀρχή. τῶν μὲν οὖν μικρῶν ὅσα γίνεται

^a Apparently a popular type of "toy-terrier."

PROBLEMS, X. 12-13

Why do dwarfs exist? Or, more generally, why are 12 some born large and others small? We must consider the question in this way. There are two causes: for it is a question either of space or of food. If the space is small, and the food scarce (they are small). Thus they try to reduce the size of animals after birth, for instance by bringing up puppies in quail cages. When the space is responsible, pygmies are born. For they have breadth and length in the same proportion as their parents, but they are small as a whole. The reason is that straight lines being crushed become curved owing to the narrowness of the space. Consequently, just like figures painted on shops, which are seen to have breadth and depth though they are small, so it is with pygmies. But those who are imperfect owing to shortage of food are seen to have limbs like children. Some, again, can be seen who are very small, but well proportioned, like Melitæan^a lap-dogs. The explanation is that nature has not the same effect as space.

Why is it that some living creatures are born from 13 other living creatures, but in other cases their creation is due to the compounding of certain elements, just as creation took place originally? As those who write about Nature say that originally the birth of living creatures was due to great changes and alterations in the world and in the universe, so now some such movements must take place, if the phenomena are to recur. For the beginning of every work is most important, for it is half the problem.^b But the seed is the origin. The reason why small creatures

^b ἀρχὴ ἡμῶν παντός, a proverb; see Leutsch, *Paroemiographi Graeci*.

892 a

μὴ ἐξ ἀλλήλων, αἴτιον <τοῦ>¹ τοιαῦτα γενέσθαι ὥσπερ ἐξ ἀρχῆς ἐγεννήθησαν ἢ τοῦ σπέρματος μικρότης· τοῦ γὰρ ἐλάττονος καὶ ἢ ἀρχὴ ἐλάττων. ὥστε ἱκαναὶ καὶ αἰ τούτου μεταβολαὶ πρὸς τὸ
 85 γεινῆσαι αὐτῷ τὸ σπέρμα, ὅπερ συμβαίνει· γίνονται γὰρ ἐν ταῖς μεταβολαῖς μάλιστα. τοῖς δὲ μείζοσι μείζονος δεῖ καὶ μεταβολῆς.

Διὰ τί τὰ μὲν πολύτεκνα τῶν ζώων, οἷον ὕς, 14
 892 b κύων, λαγώς, τὰ δὲ οὐ, οἷον ἄνθρωπος, λέων; ἢ ὅτι τὰ μὲν πολλὰς μήτρας καὶ τύπους ἔχει, ἄς καὶ πῖμπλασθαι ἐπιθυμεῖ καὶ εἰς ἃ σχίζεται ἢ γονή, τὰ δὲ τούναντίον.

Διὰ τί ἐλάχιστον διάστημα τῶν ὀμμάτων ὁ 15
 5 ἄνθρωπος ἔχει τῶν ζώων κατὰ μέγεθος; ἢ διότι μάλιστα κατὰ φύσιν ἔχει τῶν ἄλλων, ἢ δὲ αἴσθησις φύσει τοῦ² ἔμπροσθεν· ἐφ' ὃ γὰρ ἢ κίνησις, τοῦτο δεῖ προορᾶν. ὅσω δ' ἂν ἢ πλεῖον τὸ διάστημα τῶν ὀμμάτων, τοσοῦτω μᾶλλον αἰ ὄψεις ἔσονται ἐν τῷ
 10 πλαγίῳ. εἰ οὖν ἔχειν δεῖ κατὰ φύσιν, ὅτι ὀλίγιστον δεῖ τὸ διάστημα εἶναι· οὕτω γὰρ εἰς τὸ πρόσθεν μάλιστα πορεύεται. ἔτι δὲ τοῖς ἄλλοις ζώοις, ἐπεὶ χεῖρας οὐκ ἔχουσιν, ἀναγκαῖον παρορᾶν εἰς τὰ πλάγια. διὸ πλεῖον διέστηκεν τὰ ὄμματα αὐτῶν, καὶ μάλιστα τῶν προβάτων, διὰ τὸ μάλιστα ποιείσθαι τὴν πορείαν κύπτοντα.

15 Διὰ τί τὰ ἄλλα ζῶα τὰ μὲν οὐκ ἐξονειρώττει, τὰ 16
 δὲ ὀλιγάκις; πότερον ὅτι οὐδὲν ὕπτιον κατάκειται, ἐξονειρώττει δὲ οὐδὲν μὴ ὕπτιον; ἢ ὅτι οὐκ ἐνυπνιάζει τὰ ἄλλα ὁμοίως, ὃ δὲ ἐξονειρωγμὸς μετὰ φαντασίας γίνεται;

¹ <τοῦ> added by Richards.

² τοῦ Richards : τὸ Ruelle.

which are not born by sexual reproduction resemble the species as originally produced is the smallness of the seed ; for the origin of the lesser is itself less. So that the changes even of this are sufficient to account for its production from itself, and this occurs ; for they are most often born as the result of changes. But for greater creatures a greater change is necessary.

Why are some living creatures prolific, like the 14 boar, the dog and the hare, but others, like man and the lion, are not ? Is it because the former have a number of wombs and moulds which they desire to fill, and into which the seed is divided, and others are just the opposite ?

Why has man the least distance between the eyes 15 of all living creatures in proportion to size ? Is it because he follows nature more than all other creatures, and perception is naturally of what is in front ? For it is necessary to see beforehand that towards which movement takes place. The greater the distance between the eyes, the more will the eyes face sideways. If, then, it is best to follow nature, the distance between the eyes should be as small as possible ; for then the sight will travel forwards most. Again other animals need to see sideways, because they have no hands. Hence the distance between their eyes is greater, especially in sheep, because they usually move with the head bent forward towards the ground.

Why is it that of living creatures other than man 16 some never emit semen during sleep and others rarely ? Is it because no creature but man sleeps on its back, and emission of semen only takes place in this position ? Or is it because the other animals do not dream to the same extent, and emission of semen is always accompanied by imagination ?

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Διὰ τί τῶν ζώων τὰ μὲν κινεῖ τὴν κεφαλὴν, τὰ 17
 20 δὲ οὐ κινεῖ; ἢ ὅτι ἓνια οὐκ ἔχει αὐχένα; διὸ
 ταῦτα οὐ κινεῖ τὴν κεφαλὴν.

Διὰ τί ἄνθρωπος πτάρνυται τῶν ζώων μάλιστα; 18
 πότερον ὅτι τοὺς πόρους εὐρεῖς ἔχει δι' ὧν τὸ
 πνεῦμα καὶ ὀσμὴ εἰσέρχεται; τούτοις γὰρ πληρου-
 25 μένοις πνεύματος πτάρνυται. ὅτι δὲ εὐρεῖς, σημεῖον
 ὅτι ἤκιστα ὀσφραντικὸν τῶν ἄλλων ζώων· ἀκρι-
 βέστεροι δὲ οἱ λεπτότεροι. εἰ οὖν εἰς μὲν τοὺς
 εὐρεῖς πλεόν καὶ πλεονάκεις εἰσέρχεται τὸ ὑγρὸν,
 οὗ πνευματουμένου ὁ πταρμὸς γίνεται, τοιούτους
 δὲ μάλιστα τῶν ζώων οἱ ἄνθρωποι ἔχουσι, πλει-
 30 στάκεις ἂν πτάρνοιτο εἰκότως. ἢ ὅτι ἐλάχιστοι
 κατὰ τὸ μῆκος οἱ μυκτῆρες, ὥστε τὸ θερμανθὲν
 ὑγρὸν ταχὺ δύναται πνεῦμα γίνεσθαι; ἐν δὲ τοῖς
 ἄλλοις διὰ μῆκος καταψύχεται πρότερον.

Διὰ τί ἡ γλῶττα οὐδενὸς περὰ τῶν ζώων; ἢ 19
 ὅτι τὸ πῖον πυκνόν, ἡ δὲ γλῶττα ἀραιὰ-φύσει ἐστίν,
 35 ὅπως τοὺς χυμοὺς γνωρίζῃ;

Διὰ τί τὰ θήλεα συντάσει οὐρεῖ, τὰ δὲ ἄρρενα 20
 οὐ; ἢ ὅτι πορρώτερόν ἐστιν ἡ κύστις ἢ τῶν
 θηλειῶν, καὶ εἰς βάθος καὶ μῆκος; μεταξύ γὰρ
 893 a αὐτῶν ἡ μήτρα τῆς ἕδρας καὶ τῆς κύστεως. ὥστε
 δεῖται βίας πλείονος τὸ ἐκπεμπόμενον διὰ γε τὴν
 ἀπόστασιν τῆς μήτρας. βιάζεται δὲ συντεῖνον τῷ
 πνεύματι.

Διὰ τί τῶν ζώων ὅσα μὴ πέτεται, πάντα ἀπο- 21
 5 βάλλει τὰς χειμερινὰς τρίχας, πλὴν ὑός; καὶ γὰρ
 κύων ἀποβάλλει καὶ βοῦς. ἢ ὅτι θερμότατον ἡ
 ὑς ἐστίν καὶ ἐκ θερμοῦ πεφύκασιν αἱ τρίχες αὐτῇ;
 τοιοῦτον γὰρ ἐστὶ τὸ λιπαρόν. τῶν μὲν οὖν ἄλλων

PROBLEMS, X. 17-21

Why do some animals move the head, and others 17 not? Is it because some have no neck? Hence they do not move the head.

Why does man sneeze most of all creatures? Is it 18 because he has broad channels through which the breath and scent enter? When these channels are full of air, he sneezes. That these channels are broad is proved by the fact that man has less power of smelling than other animals. For the narrower the channels the more acute they are. If, then, moisture enters these broad channels in larger quantity and more often, (and when this moisture evaporates a sneeze occurs,) and man has channels of this kind more than any other animals, he would naturally sneeze most often. Or is it because his nostrils are very short in length, so that the heated moisture can easily become breath? In other animals the moisture is cooled beforehand because of the length of the nostrils.

Why is an animal's tongue never fat? Is it because 19 fat is dense, but the tongue is naturally rare, in order that it may easily recognize flavours?

Why does the female strain to pass water, whereas 20 the male does not? Is it because the bladder is farther away in the female, both in depth and length? For the womb is between the fundament and the bladder. Hence expulsion requires more force owing to the distance of the womb; the force is supplied by an effort of the breath.

Why is it that all animals which do not fly cast their 21 hair in the winter except the pig? For both the dog and the ox lose their hair. Is it because the pig is the hottest of all animals, and hair grows from heat? For fat is hot. In the case of other animals the

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ἢ διὰ τὸ ἀποψύχεσθαι τὸ ὑγρὸν ἀποπίπτουσιν, ἢ
 πέττειν τροφήν οὐ δυναμένης τῆς οἰκείας θερ-
 10 μότητος. <ἢ δὲ ὕς>¹ ἢ διὰ τὸ μηδὲν πάσχειν τὴν
 ὑγρότητα τὴν ἐν αὐτῇ, <ἢ>¹ διὰ τὸ πέττεσθαι καλῶς
 τὴν τροφήν, οὐκ ἀποβάλλει τὰς τρίχας. ὁπότε γὰρ
 ἢ αἰτία τῆς ἀποβολῆς ἐστίν, ἰκανὴ ἢ πιότης
 κωλύσαι. πρόβατα δὲ καὶ ἄνθρωποι διὰ πλῆθος
 καὶ πυκνότητα τῆς τριχὸς ἀπαθῆ ἐστίν. οὐ γὰρ
 15 δικνεῖται ἢ ψύξις εἰς βάθος, ὥστε πῆξαι τὴν
 ὑγρότητα ἢ πέψαι κωλύσαι τὴν θερμότητα.

Διὰ τί τῶν μὲν προβάτων μαλακώτεραι αἱ τρίχες 22
 ἀναφύονται τιλλόμεναι, τῶν δὲ ἀνθρώπων σκληρό-
 τεραι; ἢ ὅτι τῶν μὲν προβάτων ἐκ τοῦ ἐπιπολῆς
 20 πεφύκασιν; διὸ καὶ ἀλύπως ἐκσπῶνται, μενούσης
 τῆς ἀρχῆς τῆς τροφῆς ἀδιαφθόρου, ἢ ἐστὶν ἐν σαρκί.
 τὰ μὲν οὖν περιττώματα ἀνοιχθέντων ἐξατμίζει
 μᾶλλον, τὸ δὲ ἔριον σαρκὸς οἰκείαν τροφήν λαμ-
 βάνει· σὰρξ δὲ μαλακοῖς καὶ γλυκέσι τρέφεται.
 αἱ δὲ τῶν ἀνθρώπων τρίχες ἐκ βάθους πεφυκυῖαι
 25 βία καὶ μετ' ἀλγηδόνοσ ἐκσπῶνται. δῆλον δέ·
 ἐπισπῶνται γὰρ αἷμα. τραυματιζομένου οὖν τοῦ
 τόπου συμβαίνει αὐτὸν καὶ οὐλοῦσθαι. διὸ τέλος
 μὲν συμβαίνει γίνεσθαι τοῖς τιλλομένοις· ἕως δ'
 ἂν ἀνίωσι τρίχες, σκληρὰς ἀνιέναι διὰ τὸ τὴν μὲν
 30 τροφώδη τῆς σαρκὸς ἐκλελοιπέναι πᾶσαν τροφήν,
 ἐκ περιττωμάτων δ' αὐτὰς γίνεσθαι. σημεῖον δέ·
 τῶν μὲν γὰρ πρὸς μεσημβρίαν πάντων σκληραὶ
 εἰσιν αἱ τρίχες διὰ τὸ τὸ ἐκτὸς θερμὸν εἰς βάθος
 δικνούμενον ἐξατμίζειν τὴν εὐπεπτον τροφήν, τῶν
 δὲ ὑπὸ τὰς ἄρκτους μαλακαί· τούτοις γὰρ ἐπιπολῆς
 35 μᾶλλον ἐστὶν τό θ' αἷμα καὶ οἱ γλυκεῖς χυμοί· διὸ
 καὶ εὐχροὶ εἰσιν.

PROBLEMS, X. 21-22

shedding of hair is due either to the cooling of the moisture, or because the natural heat cannot concoct the food. But the pig, either because the moisture in it is unaffected, or because the food is well concocted, does not shed its hair. For whenever there is good reason for casting the hair, the fat is sufficient to prevent it. Sheep and men owing to the quantity and thickness of the hair are unaffected. For the chilling does not penetrate deep enough to congeal the moisture, or to prevent the heat from concocting it.

Why does the sheep grow softer wool when it is ²² plucked, but man's hair grows stiffer? Is it because sheep's wool grows from the surface? Hence it is plucked without causing pain, because the source of nourishment which is in the flesh remains undamaged. So when (the pores) are open the waste products vaporize more easily, and the wool receives the proper nourishment of the flesh; for the flesh is fed by soft and sweet food. But man's hair naturally grows from deep down, and is plucked out only by force and with pain. This is clear; for pulling out man's hair draws blood; so when the part is wounded, it shows a scar. In the end this is what happens to those whose hair is plucked out; but as long as the hair grows again, it grows hard because all the nourishment which feeds the flesh has left it, and the hair only grows from waste products. Here is evidence: all those who live in the south have stiff hair, because the external heat penetrates deep and vaporizes the digestible food, but those who live in the north have soft hair; for with them both the blood and sweet humours are on the surface; so they also have a good complexion.

¹ <ῆ δὲ ὕς> and <ῆ>, added by Forster, are necessary to the sense and appear in Th. G.

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Διὰ τί αἱ μὲν τῶν προβάτων τρίχες ὅσῳ ἂν 23
μακρότεραι ὦσι, σκληρότεραι γίνονται, αἱ δὲ τῶν
ἀνθρώπων μαλακώτεραι; ἢ ὅτι αἱ τῶν προβάτων,
οἷαν εἴρηται τροφήν ἔχουσαι, μακρὰν τῆς ἀρχῆς
40 ἀπαρτώμεναι ἀτροφώτεραί εἰσι, καὶ ῥαδίως ἐξ
893 b αὐτῶν ἐξατμίζεται ὑπὸ τοῦ θερμοῦ ἢ ἐνυπάρχουσα
τροφή δι' εὐπεψίαν; ξηραινόμεναι δὲ σκληρότεραι¹
γίνονται· τὸ γὰρ ὑγρὸν μαλακόν. αἱ δὲ τῶν
ἀνθρώπων ἐλάττω μὲν, μᾶλλον δὲ τῆς ἀρχῆς.
πέττεται δὲ αὐταῖς μᾶλλον διὰ τὸ ἐλάττω εἶναι.
5 πεττομένη δὲ μαλακωτέραν ποιεῖ τὴν τρίχα· πάντα
γὰρ τὰ πεπεμμένα τῶν ἀπέπτων μαλακωτέρα
ἐστίν. ἐκ περιπτώματος γὰρ πλείον² ἢ τοῦ ἀνθρώ-
που θρίξ ἢ ἢ τοῦ προβάτου. σημεῖον δέ· τὰ γὰρ
νέα πρόβατα τῶν παλαιῶν μαλακώτερα ἔχει τὰ
ἔρια.

10 Διὰ τί οἱ ἄνθρωποι καὶ οἱ ὄρνιθες οἱ δασεῖς 24
λάγνοι εἰσίν; ἢ ὅτι θερμοὶ καὶ ὑγροὶ τὴν φύσιν
εἰσὶ, δεῖ δὲ ἀμφοῖν πρὸς τὴν ὀχείαν; τὸ μὲν γὰρ
θερμὸν ἐκκρίνει, τὸ δὲ ὑγρὸν ἐκκρίνεται. διὰ τὸ
αὐτὸ δὲ καὶ οἱ χωλοὶ ἄνδρες· ἢ γὰρ τροφή αὐτοῖς
15 ὀλίγη κάτω μὲν ἀφικνεῖται διὰ τὴν ἀναπηρίαν τῶν
σκελῶν, εἰς δὲ τὸν ἐπάνω τόπον ἔρχεται πολλή καὶ
εἰς σπέρμα συγκρίνεται.

Διὰ τί ὁ ἄνθρωπος χαίτην οὐκ ἔχει; ἢ διότι 25
πώγωνα ἔχει, ὥστε ἢ ἐκεῖ ἀπελθοῦσα τροφή τῆς
τοιαύτης περιπτώσεως εἰς τὰς σιαγόνας ἔρχεται;
20 Διὰ τί πάντα τὰ ζῶα ἀρτίους τοὺς πόδας ἔχει; 26
ἢ ὅτι οὐκ ἐνδέχεται κινεῖσθαι μὴ ἐστηκότος τινός,
ἂν μὴ ἄλληται; ἐπεὶ τοίνυν ἐκ δυοῖν τινῶν κίνησιν
ἀνάγκη τῇ πορείᾳ εἶναι, ἔκ τε κινήσεως καὶ
στάσεως, ταῦτα δὲ δύο καὶ ἄρτια ἦδη. καὶ τετρά-

¹ ξηρότεραι Kuelle, but he suggests σκληρότεραι from Th. G.

² πλείστου Kuelle.

PROBLEMS, X. 23-26

Why is sheep's wool harder the longer it is, whereas 23 man's is softer? Is it because sheep's wool, receiving nourishment as we have described, hangs down a long way from its source and so is less nourished? Consequently the nourishment which is in it is rapidly vaporized out of it by the heat, because it is easily concocted. As it dries it becomes harder, for moisture is soft. But man's hair has less nourishment but more directly from the source.^a It is more easily concocted because there is less of it, and as concoction takes place it makes the hair softer; for everything digested is softer than the unconcocted. For man's hair is more due to waste product than sheep's wool. There is evidence of this; for young sheep have softer wool than old ones.

Why are hairy men and thick-feathered birds lust- 24 ful? Is it because they are naturally hot and moist, and both these qualities are necessary to intercourse? For heat causes excretion, and it is moisture which is excreted. For the same reason lame men are lustful, for in their case only a little nourishment passes downwards owing to their defective legs, but much travels upwards and is turned into semen.

Why has not a man a mane? Is it because he has 25 a beard, so that the nourishment which comes from such waste product goes into the jaws?

Why do all animals have an even number of feet? 26 Is it because movement is impossible if there is no stationary limb, unless one jumps? Since, then, it is necessary for progress that movement should arise from two conditions, that is from movement and from standing, this necessitates a pair and an even number.

^a The text here is uncertain; the above is the sense given by Th. G.

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ποδα, δύο ἔτι¹ πλείους· τοὺς μὲν γὰρ δύο κινεῖ, οἱ
 25 δὲ δύο ἐστήκασι, καὶ οἱ ἕξ· καὶ τὰ ἄλλα δὲ δύο
 ἔτι¹· τούτων δὲ τὸ μὲν κινεῖται, τὸ δὲ ἔστηκεν.

Διὰ τί τοῖς μὲν ἵπποις καὶ τοῖς ὄνοις ἐκ τῶν 27
 οὐλῶν φύονται τρίχες, τοῖς δὲ ἀνθρώποις οὐ; ἢ
 διότι τοῖς μὲν ἄλλοις ζώοις ἐστὶ τὸ δέρμα μέρος
 30 τῆς σαρκός, ἀνθρώπῳ δὲ καθάπερ πάθος σαρκός;
 δοκεῖ γὰρ αὐτοῖς τὸ ἐπιπολῆς καταψυχόμενον
 στερεώτερον γίνεσθαι, καθάπερ τῶν ἐφθῶν ἀλεύ-
 ρων αἱ γραῖαι καλούμεναι. ἐπεὶ οὖν κακείναι
 εἰσιν ἄλευρον ἐφθόν, καὶ τὸ τοῦ ἀνθρώπου καλού-
 μενον δέρμα σὰρξ ἂν εἴη. τραυματισθέντος δὲ ἢ
 35 τριβέντος ἀνθρώπου μὲν τὴν σάρκα συμβαίνει
 πυκνοῦσθαι· διὸ ἡλλοιωμένης τῆς ἐπιπολῆς σαρκός
 οὐ τὴν αὐτὴν φύσιν λαμβάνει τὰ τραύματα ἢ περ
 καὶ ἐκ γενετῆς· ἀλλοιωθείσης δ' αὐτῆς μὴ γίνεσθαι
 ἔτι τὸ ἐξ αὐτῆς οὐθὲν ἄτοπον, καθάπερ καὶ ἐκ τῶν
 ἀλωπεκιῶν καλουμένων· καὶ γὰρ αὐταὶ τῆς ἐπι-
 40 πολῆς σαρκός φθοραὶ καὶ ἀλλοιώσεις εἰσίν. τῶν
 894 a δὲ ὑπόζυγιων τριβέντων καὶ ὑγιαζομένων πάλιν
 ἀναπληροῦνται τὰ νενοσηκότα μέρη τοῦ σώματος
 τῶν αὐτῶν μὲν, ἀσθενεστέρων δ' ἢ ἐξ ἀρχῆς ἦν.
 ἐπεὶ δ' ἐστὶ καὶ τὸ δέρμα μέρος αὐτῶν, γίνονται
 τε ἂν καὶ φύονται τρίχες (ἐκ δέρματος γὰρ φύον-
 5 ται τρίχες), λευκαὶ δὲ φύονται διὰ τὸ τὸ δέρμα
 ἀσθενέστερον γεγονέναι τοῦ ἐξ ἀρχῆς, καὶ τὴν
 λευκὴν ἀσθενεστάτην εἶναι τρίχα.

Διὰ τί ἐν μὲν τοῖς ἄλλοις ζώοις διαμένει ὁμοίως 28
 τὰ δίδυμα, θήλεος καὶ ἄρσενος ὄντος, ἐν δὲ τοῖς
 ἀνθρώποις οὐ; ἢ διότι τούτῳ ἀσθενῆ μάλιστα τὰ
 10 δίδυμα· μονοτόκον γὰρ ἐστίν; ἐν δὲ τοῖς διδύμοις
 παρὰ φύσιν τὸ θῆλυ γίνεσθαι καὶ ἄρρεν, ὥστε

Four-footed animals have two more legs ; for in their case two move and two are stationary ; some animals have six, that is an additional two ; of these one of each pair moves while the other is stationary.

Why do hairs grow from scars on horses and asses, 27 but not on men ? Is it because in other animals the skin is an integral part of the flesh, whereas in man it is a kind of condition of the flesh ? For in man the surface, when it gets chilled, seems to grow harder, like what is called the crust which forms on boiled barley. Since, then, this crust is merely boiled barley, so what is called man's skin is really flesh. When, then, a man is wounded or chafed the flesh thickens ; so as the surface of the flesh changes in character the wound has not the same characteristics as it had to begin with, and as the skin itself is changed it is not surprising that what grew from it no longer does so, as in the case of the disease called alopecia ; for this is also due to destruction of the surface of the flesh and a change in its condition. But when cattle have been chafed and recover, the damaged parts of the body are replaced in their original condition though weaker than they were to begin with. Since, then, the skin is part of themselves, hair would naturally appear and grow (for hair grows from the skin), but the hair grows white because the skin is weaker than it was to begin with, and white hair is the weakest hair.

Why is it that in other animals twins survive just as 28 well when they are male and female, but this is not so in human beings ? Is it because with them twins are always very weak ; for man naturally has one child at a time ? But in the case of twins a male and female

¹ δύο ἔτι Forster : διότι Ruelle.

ὁ μάλιστα ἐστὶ παρὰ φύσιν, τοῦτο καὶ ἀσθενέ-
στατον.

Διὰ τί τοῖς μὲν ἵπποις καὶ τοῖς ὄνοις ἐκ τῶν 29
οὐλῶν φύονται τρίχες, τοῖς δὲ ἀνθρώποις οὐ; ἢ
διότι ἢ οὐλή κωλύει διὰ τὴν πύκνωσιν ἢ διὰ τὸ
15 φθείρειν τὴν τροφήν; τοῖς μὲν οὖν ἀνθρώποις
παντελῶς κωλύει διὰ τὴν ἀσθένειαν τῆς τριχός,
τοῖς δὲ ἵπποις οὐκ ἐκώλυσεν, διέφθειρε δέ.

Διὰ τί τοῖς ζώοις ἄρτιοι πόδες; ἢ ὅτι παντὸς μὲν 30
τοῦ κινουμένου ἀνάγκη τι ἡρεμεῖν, συνέβαιεν δὲ
περιπτῶν ὄντων μὴ γίνεσθαι τοῦτο, εἶπερ¹ κατὰ
20 τὴν ἀντιστοιχίαν τῶν ποδῶν ἦν ἡ κίνησις.

Διὰ τί ἐλάττω χρόνον τὰ ζῶα καθεύδει ἢ ἐγρή- 31
γορεν, οὐ συνεχῶς δέ; ἢ διὰ τὸ μὴ ἅμα πᾶσαν
πέττεσθαι τὴν περίπτωσιν; ἀλλ' ὅταν τι πεφθῇ,
κουφισθὲν διεγείρεται. καὶ πλεονάκεις δ' ἐγεί-
25 ρονται, ὅσοις ψυχρὸς ὁ τόπος ὁ πέττων ἐστὶν τὴν
περίπτωσιν· ταχὺ γὰρ παύεται καὶ πολλάκις, ἢ δὲ
διάπαυσις ἐγερσίς ἐστίν. ἦδὺ δέ, ὡς² εἰκός, διὰ
τὸ ἀνάπαυσιν εἶναι φαίνεται. ἀλλ' οὐδ' ἐνταῦθα
πλείω χρόνον ἢ ἀνάπαυσις γίνεται τῶν κατὰ
φύσιν ἔργων· οὐδ' εἰ τὸ ἐσθίειν ἦδιον τοῦ μή,
ὅμως πλείω χρόνον ἐσθίουσιν ἢ ἀσιτοῦσιν.

30 Διὰ τί τῶν ζώων τὰ μὲν εὐθὺς ἀκολουθεῖ τοῖς 32
γεννήσασιν, τὰ δ' ὄψέ, οἷον ἄνθρωπος, ἢ μόλις, ἢ
οὐδέποτε; ἢ διότι τὰ μὲν ταχὺ ἀπολαμβάνει τὸ
γνωρίζειν, τὰ δ' ὄψέ; καὶ τὰ μὲν ἀναίσθητα τοῦ
ὠφελούντος, τὰ δὲ ἔχει αἴσθησιν. ὅσα μὲν οὖν
35 ἄμφω ἔχει ταῦτα (λέγω δ' οἷον καὶ αἴσθησιν τοῦ
ὠφελούντος καὶ ἐπιτέλεσιν τοῦ σώματος), ἀκο-

¹ εἶπερ Richards : ὅπερ Ruelle.

² ὡς Forster from Th. G. : οὐδὲ Ruelle.

child is unnatural, and that which is unnatural is weakest.

Why does hair grow from scars in horses and asses, 29 but not in man? Is it because a scar prevents the growth of hair either from thickening or by destroying its food? So in man's case its prevention is complete because of the weakness of the hair; in the case of horses it does not prevent it, but it spoils it.

Why have animals an even number of feet? Is it 30 because when anything moves something must be at rest, and this is impossible if the number is odd, for movement was made possible by the arrangement of the feet in pairs.

Why do animals spend less time asleep than awake, 31 and do not sleep continuously? Is it because all the waste product is not concocted at once? But when some is concocted, the animal is relieved and awakes. They awake commonly when the region which absorbs the waste moisture grows cold, for this region often ceases to function and this cessation involves awakening. Sleep naturally seems pleasant because it is a cessation of work. But we do not spend more time in rest than in our natural activities; in the same way although eating is more pleasant than not eating, we do not eat for a longer period than we abstain from food.

Why do some animals copy their parents immedi- 32 ately, but others only at a late date, like man, or only to a small degree, or never? Is it because some are quick to recognize and others slow? Some, again, have no perception of what is beneficial, while others have. Those, then, that possess both these qualities (I mean perception of what is beneficial and perfection of body) copy their parents, but those that have

894^a λουθεῖ, τὰ δὲ μὴ ἄμφω οὐ ποιεῖ τοῦτο· δεῖ γὰρ δύνασθαι καὶ διαισθάνεσθαι.

Διὰ τί λεύκη οὐ γίνεται τοῖς ἄλλοις ζώοις; 33
 894^b πότερον ὅτι τοῖς μὲν ἄλλοις νόσημα, τοῖς δὲ ἀν-
 θρώποις γίνεται διάλευκα τὰ δέρματα καὶ αἱ
 τρίχες αὐτῶν; ἀλλ' ὅμως ἀπορήσειεν ἄν τις διὰ
 τί ὕστερον οὐ γίνεται, ἀλλ' ἐκ γενετῆς ἢ ποικιλία.
 ἢ ὅτι τὰ δέρματα τῶν ἄλλων ζώων σκληρά, ἀν-
 θρωπος δὲ φύσει λεπτοδερμότατον; ἢ δὲ λεύκη
 5 πνεύματός ἐστιν ἔκκρισις, ὃ κωλύεται διὰ τὴν
 πυκνότητα ἐξιέναι τοῖς ἄλλοις ζώοις τοῦ δέρματος.

Διὰ τί δὲ ἐν μὲν τῇ λεύκῃ πολιαὶ γίνονται, ὅπου 34
 δὲ πολιαί, οὐκ αἰεὶ λεύκη; ἢ διότι αἱ τρίχες ἐκ
 τοῦ δέρματός εἰσιν, ἢ δὲ πολιαὶ ὡσπερ σαπρότης
 10 τις τῶν τριχῶν ἐστιν; ὅταν μὲν οὖν τὸ δέρμα
 κάμνη, ἀνάγκη καὶ τὴν τρίχα ἐξ ἐκείνου οὔσαν
 κάμνειν· ὅταν δὲ ἢ θρίξ, οὐκ ἀνάγκη τὸ δέρμα.

Διὰ τί τῶν ζώων τὰ μὲν χαλεπά ἐστι μετὰ τὸν 35
 τόκον, οἷον κύων καὶ ὕς, τὰ δὲ οὐδὲν ἐπιδήλως,
 οἷον γυνή, πρόβατον; ἢ ὅτι ὅσα μὲν περιττω-
 15 ματικὰ πραέα; ἀπέρχεται γὰρ ἐν τῷ τόκῳ τὰ
 λυποῦντα. ὅσοις δὲ ἀπὸ τῶν εὖ ἐχόντων γίνεται
 ἢ ἀφαίρεσις, * * * ἢ ἰσχνότης ποιεῖ διὰ τὴν ἔξιν
 τὴν ὀργήν, ὡσπερ καὶ αἱ ἀλεκτορίδες οὐ τεκοῦσαι
 χαλεπαί, ἀλλ' ἐπωάζουσαι, διὰ τὴν ἀσιτίαν.

Διὰ τί οἱ εὐνοῦχοι τὰ μὲν ἄλλα εἰς τὸ θῆλυ 36
 20 διαφθειρόμενοι μεταβάλλουσιν· καὶ γὰρ φωνὴν
 θηλυκὴν ἴσχουσιν καὶ ἀμορφίαν¹ καὶ ἀναρθρίαν, καὶ
 οὕτω σφόδρα μεταπίπτουσιν ὡς καὶ ἐν τοῖς ἄλλοις

¹ ἀμορφίαν X^a: ὀξύτητα Ruelle.

^a Cf. Problem 4.

^b There are some words missing from the mss. here.

not both these qualities do not. For they must both have the physical capacity and the perceptive.

Why does not leprosy occur in any animal except 33 man? Is it that the disease does affect other animals, but that only in man does the skin and hair become white? Yet one might wonder why it does not only become so later on, but that the variation in colour takes place from birth. Or is it because the skin of other animals is hard, but man is naturally very thin-skinned? Now leprosy is an expulsion^a of the breath, which is prevented by the thickness of the skin from escaping in other animals.

Why is it that in leprosy the hair turns grey, but 34 that there is not always leprosy where there is grey hair? Is it because hair grows from the skin, but grey hair is a kind of decay of the hair? So when the skin grows weak, the hair that grows from it must also be weak, but when the hair is weak, the skin need not necessarily be so.

Why are some animals ill-tempered after bearing 35 offspring, such as the dog and pig, but others do not show obvious ill-temper, like women and sheep? Is it true that those which are full of waste products are mild? For the causes of discomfort pass in the bearing of the offspring. But those from whom the drawing off takes place while they are in good condition,^b their thinness causes temper because of their condition, just as hens are not ill-tempered when they have laid an egg, but while they are sitting, owing to lack of food.

Why do eunuchs change in other ways into the 36 likeness of the female when mutilated; for they have a woman's voice and shapelessness and the looseness of joints, and they change just as violently as the other

894 b

ζώοις τὰ ἐκτεμνόμενα. ἐναντίως δ' οἱ ταῦροι καὶ
οἱ κριοὶ τὰ κέρατα ἴσχουσι, διότι καὶ τὰ θήλεα
ἐναντίως αὐτῶν ἔχει. διὸ οἱ μὲν μείζω ἐκτεμνό-
25 μανοὶ ἴσχουσιν, οἱ δὲ ἐλάττω. τὸ δὲ μέγεθος μόνον
οἱ εὐνοῦχοι εἰς τὸ ἄρρεν μεταβάλλουσιν· μείζους
γὰρ γίνονται. ἔστι δὲ τοῦτο τοῦ ἄρρενος· τὰ γὰρ
θήλεα ἐλάττω ἐστὶ τῶν ἀρρένων. ἢ οὐδὲ τοῦτο
εἰς τὸ ἄρρεν, ἀλλ' εἰς τὸ θῆλυ; οὐ γὰρ εἰς πᾶν τὸ
μέγεθος, ἀλλ' εἰς τὸ μῆκος μόνον, τὸ δὲ ἄρρεν καὶ
30 εἰς πλάτος καὶ εἰς βάθος· τότε γὰρ τετελείωται.
ἔτι δὲ ὡς ἔχει τὸ θῆλυ πρὸς τὸ ἄρρεν, οὕτως αὐτοῦ
τοῦ θήλεος ἢ παρθένος πρὸς τὴν γυναῖκα· ἢ μὲν
γὰρ ἤδη γενναία, ἢ δὲ οὐ. εἰς τὴν τούτων οὖν
μεταβάλλει· ἐπὶ μῆκος γὰρ ταύταις ἢ αὐξήσεις.
διὸ καὶ "Ὀμηρος εὖ τὸ " μῆκος δ' ἔπορ' " Ἀρτεμις
35 ἀγνή," ὡς διὰ τὴν παρθενίαν, ὃ εἶχε, δυναμένης
δοῦναι. οὐκ οὖν εἰς τὸ ἄρρεν κατὰ τὸ μέγεθος
μεταβάλλει. οὐ γὰρ εἰς τὸ τέλειον μεταβάλλει.
οἱ δὲ εὐνοῦχοι εἰς μέγεθος τὸ μῆκος ἐπιδιδόασιν.

Διὰ τί οἱ εὐνοῦχοι ἢ ὅλως οὐκ ἴσχουσιν ἢ ἡττον 37
895 a ἰξίας; ἢ ὅτι μεταβάλλουσι τὴν φύσιν ἐν τῇ ἐκ-
τμήσει εἰς τὰ ἄγωνα; τοιαῦτα δὲ παῖς καὶ γυνή,
ᾧ οὐδέτερον ἴσχει ἰξίας, εἰ μὴ τι σπάνιον γυνή.

Διὰ τί μᾶλλον ἄνθρωπος πολλὰς φωνὰς ἀφίησιν, 38
5 τὰ δὲ ἄλλα μίαν, ἀδιάφορα ὄντα τῷ εἶδει; <ἦ>¹ καὶ
τοῦ ἀνθρώπου μία φωνή, ἀλλὰ διάλεκτοι πολλαί;

¹ <ἦ> added by Forster.

animals when castrated. Castrated bulls and rams grow horns of the type opposite (to the normal male), because the females are opposite to the males. So castrated bulls grow larger horns and rams smaller. In the matter of size only the eunuchs change to the male type, for they grow larger; and size is characteristic of the male, for the female is smaller than the male. Or is this not also a change not to the male type but to the female? For they change not to size in every direction but only in height, but the male type tends to size in breadth and depth as well: for then the type is perfect. The relationship of the female to the male is the same as the young of the female sex to the grown woman, for the latter is already noble in form, but the former is not. And so the change is into the type of the immature: for their increase is in height. So Homer^a well says "chaste Artemis gave them height," being able to give what she possessed in virtue of her maidenhood. So there is no change to the male type in the matter of size, for the change is not to the perfect type. But the eunuch's only increase in size is in height.

Why are eunuchs generally not subject to vari- 37
cocele, or less so than others? Is it because by castration they change their nature into that of the unproductive? Such are the child and the woman, neither of whom has varicose veins, except occasionally the woman.

Why does man show great variety of voice, but other 38
animals have only one, unless they are of different species? Or has man only one voice, though many varieties of speech?

^a Homer, *Od.* xx. 71.

895 a

Διὰ τί δὲ αὕτη ἄλλη, τοῖς δὲ ἄλλοις οὐ; ἢ ὅτι 39
οἱ μὲν ἄνθρωποι γράμματα πολλὰ φθέγγονται, τῶν
δὲ ἄλλων τὰ μὲν οὐδέν, ἓνια δὲ δύο ἢ τρία τῶν
10 ἀφώνων; ταῦτα δὲ ποιεῖ μετὰ τῶν φωνηέντων
τὴν διάλεκτον. ἔστι δὲ ὁ λόγος οὐ τὸ τῆ φωνῆ
σημαίνειν, ἀλλὰ τοῖς πάθεσιν αὐτῆς, καὶ μὴ ὅτι
ἀλγεί ἢ χαίρει. τὰ δὲ γράμματα πάθη ἐστὶ τῆς
φωνῆς. ὁμοίως δὲ οἷ τε παῖδες καὶ τὰ θηρία
δηλοῦσιν· οὐ γάρ πω οὐδὲ τὰ παιδιά φθέγγονται
τὰ γράμματα.

15 Διὰ τί μόνον τῶν ἄλλων ζώων ἄνθρωπος γίνεται 40
ἰσχυρόφωνον; πότερον ὅτι καὶ ἐνεόν, ἢ δὲ ἰσχυρο-
φωνία ἐνεότης ἐστίν; ἀλλὰ δὴ καὶ οὐδ' ὅλως
πεπλήρωται τοῦτο τὸ μόριον. ἢ ὅτι κοινώνει
μᾶλλον λόγου, τὰ δ' ἄλλα φωνῆς; ἔστι δὲ ἢ
ἰσχυροφωνία κατὰ τὸ ὄνομα οὐδέν ἢ¹ οὐ συνεχῶς
διεξιέναι.

20 Διὰ τί ἄνθρωπος γίνεται ἐκ γενετῆς χωλὸς 41
μάλιστα τῶν ἄλλων ζώων; πότερον ὅτι ἰσχυρὰ
τῶν ἄλλων ἐστὶ σκέλη τῶν ζώων; ὁστώδη γὰρ
καὶ νευρώδη καὶ τετράποδα καὶ οἱ ὄρنيθες ἔχουσιν,
οἱ δὲ ἄνθρωποι σαρκώδη· διὰ τὴν ἀπαλότητα οὖν
θᾶπτον πηροῦνται ἐν τῆ κινήσει. ἢ διότι μόνον τῶν
25 ζώων πολλοὺς ἔχει χρόνους τῆς γενέσεως; καὶ
γὰρ ἐπτάμηνα καὶ ὀκτάμηνα καὶ δεκάμηνα γίνεται.
τοῖς δ' ἄλλοις εἰς χρόνος τῆς τελειώσεως γέγονεν
οὐ διατρίψας· τοῖς δ' ἀνθρώποις πολὺς ὁ χρόνος
γίνεται τῆς ἐν πλήθει διατριβῆς, ὥστε κινουμένων
διὰ τὸ ἀπαλὰ εἶναι καὶ θραύεται τὰ ἀκρωτήρια ἐν
30 τῷ πλείονι χρόνῳ πλείω.

¹ Reading above from Forster; οὐ κατὰ τὸ ὄνομα ἐν ἢ οὐδὲ Ruelle.

Why does this speech take different forms, when 39
it does not with other animals? Is it because man
can utter a number of letters, but of the other animals
some utter none and some only two or three con-
sonants? These consonants combined with vowels
make articulate speech. Now speech consists of con-
veying a meaning not by the voice, but by certain
affections of it, and not only shows pain and pleasure.
Now the letters are affections of the voice. Children
and beasts show their meaning in the same way, for
children cannot yet pronounce the letters.

Why is man the only living creature that stammers? 40
Is it because he also suffers alone from dumbness, and
stammering is a form of dumbness? Only in the case
of stammering the whole of this member is not affected.
Or is it because man partakes more of rational speech,
but other animals only possess voice? Stammering,
as the derivation of the word shows,^a is nothing except
an inability to express oneself continuously.

Why is it more common for a man to be born lame 41
than for any other animal? Is it because the legs of
other animals are strong? For four-footed beasts
and birds have bony and sinewy legs, but men have
fleshy legs; so because of their softness they are
more quickly maimed by movement. Or is it because
men alone of living creatures have many seasons of
birth? For some are born after the seventh month,
some after the eighth and some after the tenth. But
in the other animals there is only one time for each to
reach the perfect state and there is no delay; but in
the case of man the period of delay is a long one, so
that, as they move considerably, owing to softness the
extremities are apt to be damaged more often in the
longer time.

^a From *ἰσχύω*, a form of *ἰσχω*, to check.

895 a

Διὰ τί οἱ εὐνοῦχοι ἐλκώδεις τὰς κνήμας ἴσχουσι 42
καὶ σαπράς; πότερον ὅτι καὶ αἱ γυναῖκες, οἱ δ'
εὐνοῦχοι γυναικικοί; ἢ τοῦτο μὲν συμβέβηκεν,
αἴτιον δὲ καὶ ταῖς γυναῖξιν ὅτι ἡ θερμότης κάτω
35 ὄρμα. δηλοῖ δὲ τὰ γυναικεῖα. διὸ οὐδὲ οἱ εὐνοῦχοι
οὐδὲ γυναῖκες δασεῖς γίνονται, διὰ πολλὴν ὑγρότητα.

Διὰ τί τῶν ζώων οὐθὲν λιθιά ἀλλ' ἢ ἄνθρωπος; 43
ἢ ὅτι τῶν μὲν ὑποζυγίων καὶ τῶν πολυωνύχων οἱ
πόροι τῆς κύστεως εὐρεῖς εἰσίν; ὅσα δὲ μὴ τὸ
895 b πρῶτον, ὕστερον δὲ ζωστοκεῖ ἐν αὐτοῖς, οἷον ἐνιοὶ
τῶν ἰχθύων, τούτων δὲ οὐδὲν κύστιν ἔχει, ἀλλ' εἰς
τὴν κοιλίαν αὐτοῖς ἢ τοιαύτη συνθλίβεται ὑπό-
στασις, οἷον καὶ τοῖς ὄρνεσιν, ὥστε ταχὺ καὶ
διεξέρχεται κατὰ τὴν ἔδραν. ὁ δὲ ἄνθρωπος
5 κύστιν τε ἔχει καὶ στενὸν τὸν καυλὸν ὡς κατὰ
μέγεθος. διὰ μὲν οὖν τὸ ἔχειν τοῦτο τὸ μόριον
συνθλίβεται τὸ γεῶδες εἰς τὴν κύστιν (διὸ καὶ χρώ-
ζονται αἱ ἀμίδες ὑπ' αὐτοῦ), διὰ δὲ τὴν θερμότητα
τοῦ τόπου συμπέττεται καὶ παχύνεται μᾶλλον,
ἐμμένει δὲ καὶ αὐξάνεται διὰ τὴν στενότητα τοῦ
10 οὐρητήρος· οὐ γὰρ δυνάμενα τὰ γεώδη ὑποστήματα
ῥαδίως ὑπεξίεναι, πρὸς ἄλληλα ὑποστρεφόμενα
γίνεται λίθος.

Διὰ τί οὐκ ἐρεύγεται τὰ ὑποζύγια, οὐδὲ οἱ βόες 44
καὶ τὰ κερατοφόρα, οὐδὲ οἱ ὄρνεθες; ἢ διὰ ξηρό-
τητα τῆς κοιλίας; ταχὺ γὰρ ἀναλίσκεται τὸ ὑγρὸν
15 καὶ διηθεῖται· ἐμμένοντος δὲ καὶ πνευματουμένου
γίνεται ὁ ἐρευγμός. τοῖς δὲ λοφούροις διὰ μῆκος
τοῦ αὐχένος εἰς τὸ κάτω ὄρμα τὸ πνεῦμα, διὸ καὶ
ἀποψοφοῦσι μάλιστα. οἱ ὄρνεθες δὲ καὶ τὰ κερατο-
φόρα οὐ ποιεῖ οὐδέτερον. οὐδὲ ἐρεύγονται δὲ ὅσα
μηρυκάζει, διὰ τὸ πολλὰς ἔχειν κοιλίας καὶ τὸν
230

Why do eunuchs have sores and ulcers on their 42 legs? Is it because women also have them, and eunuchs are like women? Or while this is true, is there an additional reason in women that the heat presses downwards? Women's illnesses show this. So neither eunuchs nor women are hairy, because of their great moisture.

Why is it that no living creatures suffer from stone, 43 except men? Is it because the channels of the bladder are wider in the case of animals and creatures with talons? Of those again which bear their young alive, not at first but at a later date (as some fishes do), none has a bladder. In these animals any sediment of this kind is forced into the stomach, as it is with birds, so that it quickly passes out through the fundament. But man has a bladder and a stem which is narrow in proportion to his size. Because he has this part, earthy matter passes into the bladder (so chamber-pots are coloured by it), and owing to the warmth of the region grows more concocted and thick and remains and increases in size owing to the narrowness of the urethra; for as the earthy sediment cannot easily pass out, it unites and forms gallstones.

Why do neither beasts of burden nor oxen nor any 44 horned animal nor birds belch? Is it because of the dryness of their stomach? For the moisture is quickly expended and passes through; but belching is caused when the moisture remains and becomes full of air. In animals with long manes and tails owing to the length of neck the breath passes downwards, and they break wind most. But birds and horned animals do neither. Nor do animals which chew the cud belch, because they have many stomachs and what is called

895^b
 20 καλούμενον κεκρύφαλον· διὰ πολλῶν οὖν γίνεται
 καὶ ἄνω καὶ κάτω τῷ πνεύματι ἢ πορεία, καὶ
 φθάνει ἀναλισκόμενον τὸ ὑγρὸν πρὶν ἐμπνευμα-
 τωθῆναι καὶ ποιῆσαι ἢ ἐρυγεῖν ἢ ψοφῆσαι.

Διὰ τί ὅσα μὲν ἡμέρα τῶν ζώων ἐστί, πάντως καὶ 45
 ἄγρια, ὅσα δὲ ἄγρια, οὐ πάντως ἡμέρα; καὶ γὰρ
 25 ἄνθρωποι που φαίνονται ἄγριοι ὄντες καὶ κύνες
 ἐν Ἰνδοῖς καὶ ἵπποι καὶ ἄλλοθι, ἀλλ' οὐ λέοντες
 ἡμεροὶ οὐδὲ παρδάλεις οὐδ' ἔχεις οὐδ' ἄλλα πολλά.
 ἢ ὅτι ῥᾶον τὸ φαῦλον καὶ γενέσθαι ἐξ ἀρχῆς καὶ
 μεταβαλεῖν εἰς αὐτό; ἢ γὰρ φύσις οὐχ ἢ πρώτη,
 ἀλλ' ἢ ἐν τέλει ἐργώδης τυχεῖν εὐθύς. διὸ πάντα
 30 καὶ τὰ ἡμέρα ἄγρια γίνονται τὸ πρῶτον μᾶλλον
 ἢ ἡμέρα, οἷον παιδίον ἢ ἀνὴρ παμφάγον καὶ τῷ
 θυμῷ ζῶν· ἀλλὰ ἀσθενέστερα. ὥσπερ οὖν καὶ
 ἐπὶ τῶν ἔργων τῆς τέχνης, οὕτως ἔχει καὶ ἐπὶ τῶν
 τῆς φύσεως ἔργων. καὶ γὰρ ἐπὶ τούτων πάντ'
 ἐστὶ φαύλως εἰργασμένα, καὶ πλείω τὰ φαῦλα,
 35 κλίνη καὶ ἱμάτιον καὶ ἄλλ' ὅτιοῦν. καὶ ὁ μὲν ἐστί
 καλόν, λαβεῖν ἐστὶν ἅπαν καὶ φαῦλον, ὁ δὲ φαῦλον
 οὐ πᾶν καὶ καλόν, οἷον εἴ τις ἐπὶ τῶν ἀρχαίων
 γραφέων καὶ ἀνδριαντοποιῶν ἐπισκοπεῖ τὰ ἔργα·
 οὐ γὰρ ἦν πώποτε οὐδαμῇ γραφὴ σπουδαία οὐδὲ
 ἀνδριάς, φαῦλα δὲ ἦν. ὁμοίως δὲ καὶ ἢ φύσις
 898^a φαῦλα μὲν πάντα ποιεῖ, καὶ πλείω,¹ σπουδαῖα δ'
 ἐλάττω, καὶ οὐ πάντα δύναται. τὸ δὲ ἡμερον
 βέλτιον, τὸ δὲ ἄγριον φαῦλον. φύσει δὲ οὐ τῇ ἐξ
 ἀρχῆς, ἀλλ' ἐφ' ἣν, οἶμαι, ῥᾶον ποιεῖ σπουδαῖα καὶ

¹ Omitting καὶ πλείους (Ruelle) with Forster.

a "second stomach"; so there is a passage for the breath both up and down through the several channels, and the moisture is consequently exhausted before it becomes filled with air and causes either belching or breaking wind.

Why is it that all those animals which are found 45 tame are always found wild as well, but the converse is not true? For even men are found wild in some places, and dogs among the Indians, and horses elsewhere, but lions, leopards and snakes are not found tame anywhere, and many other creatures. Is it because the lower form of life is both more easily born to begin with and it is also more easy to degenerate into it? For the full realization is not the first step, but it is a hard task to achieve it. So all tame animals are wild to begin with rather than tame (for example, a child is greedier and displays more temper than a man) but weaker. The same principle applies to works of nature as to works of art. For in the latter all kinds of things are badly made, indeed there are more bad ones, whether bed, coat or anything else. Where there is anything good it is always possible to find a bad one, but where there is a badly made thing one cannot always find a good one; this will be obvious if one examines the work of old painters and sculptors. For at that time there was no excellent painting or statue anywhere, but only inferior work. In the same way nature makes everything in an inferior form, and a larger number of these, but fewer fine specimens, and cannot make all types fine. Now the tame is the better, and the wild the worse. Now by nature—I mean not primitive nature but that to which the type develops—it is easier, I suppose, to make the finer type tame. But the opposite kind

896^a ἡμερα. τὰ δὲ ἐναντία ἢ οὐδέποτε ἢ μόλις, καὶ
 5 ἔν τισι τόποις καὶ ἐν χρόνοις, ἢ ἀρτί¹ ἢ ποτέ,
 ἔν τινι κράσει τοῦ ὄλου, γίνονται ἡμερα τὰ ζῶα
 πάντα. τὸ δ' αὐτὸ καὶ ἐπὶ τῶν φυτῶν πάντων
 ἐστίν· ὅσα μὲν γὰρ ἡμερα, καὶ ἄγρια, οὐ πάντα δὲ
 δύναται ἡμεροῦσθαι, ἀλλ' ὅμως εἰσὶν ἐν ἰδίᾳ χώρᾳ
 πρὸς πολλὰ ἰδίως ἔχοντα, ὥστε ἡμελημένα καὶ
 10 ἄγρια κρείττω καὶ ἡμερώτερα φύεσθαι τῶν ἐν
 ἄλλῃ γεωργομένων.

Διὰ τί τοῖς μὲν ἀνθρώποις οἱ ὀμφαλοὶ μεγάλοι 46
 γίνονται, τοῖς δ' ἄλλοις ζώοις οὐ φανεροί; ἢ διότι
 τοῖς μὲν διὰ τὸ πολὺν χρόνον εἴσω ἐμμένειν ἀφ-
 15 ναίνονται καὶ εὐθὺ τείνονται, ὄλον δ' ἐπανοιδουσι
 τὰ ἔλκη, διὸ ἐνιοὶ τῶν ὀμφαλῶν καὶ αἰσχίους εἰσὶν·
 ὁ δὲ ἄνθρωπος ἀτελής ἐξέρχεται, ὥστε ἔφυγροι
 καὶ ἔναιμοι οἱ ὀμφαλοὶ ἀκολουθοῦσιν. ὅτι δὲ τὰ
 μὲν τετελειωμένα, τὰ δὲ ἀτελῆ ἐξέρχεται, σημεῖον,
 ὅτι τὰ μὲν εὐθὺς δύναται ζῆν, τὰ δὲ παιδία ἐπι-
 μελείας δεῖται.

20 Διὰ τί τὰ μὲν τῶν ζώων ἅπαξ ὀχεύεται, τὰ δὲ 47
 πολλάκις, καὶ τὰ μὲν ὥρα ἔτους, τὰ δ' ὅτε ἔτυχεν,
 ἄνθρωπος μὲν αἰεί, τὰ δὲ ἄγρια οὐ πολλάκις, καὶ
 ὅς μὲν ἄγριος ἅπαξ, ἡμερος δὲ πολλάκις; ἢ διὰ
 τὴν τροφήν καὶ ἀλέαν καὶ πόνον; ἐν πλησμονῇ
 25 γὰρ Κύπρις. ἔπειτα τὰ αὐτὰ ἄλλοθι μὲν ἅπαξ
 τίκτει, ἄλλοθι δὲ πλεονάκις, οἷον τὰ πρόβατα ἐν
 Μαγνησίᾳ καὶ Λιβύῃ τίκτει δῖς. τὸ δ' αἴτιον ἢ
 πολυχρονία τοῦ τόκου· οὐ γὰρ ἐπιθυμεῖ ὅταν
 πλησθῆ, ὥσπερ οὐδὲ τροφῆς τὰ πλήρη. τὰ δὲ
 κυοῦντα ἤττον ὀχείας ἐπιθυμεῖ διὰ τὸ μὴ γίνεσθαι
 τὴν κάθαρσιν.

¹ ἀρτί Bussemaker: ἀρτίου Ruelle.

can seldom or never be tamed, and it is only in certain places and at certain seasons either sooner or later by some admixture of the whole that all animals can become tame. The same thing is also true in the case of all plants ; those that are tame are also found wild, but not all kinds can be tamed, but nevertheless some in their own native soil are so related to their special conditions that when neglected and wild they always grow better and more tame than those which are cultivated in alien soil.

Why do men's navels grow large, but in other 46 creatures are not obvious ? Is it because men remain longer in the mother and so the navel withers and stretches and sometimes swells into sores, so that some navels become uglier ? For man comes into the world imperfect, so that the navel comes away full of moisture and blood. That some creatures are born perfect and some imperfect is evident, because some can fend for themselves immediately, but children require great care.

Why do some creatures mate once, and others more 47 often ? Some again mate at one season of the year, others according to chance, but man at any time, whereas wild animals do not mate often ; the wild pig mates once, but the domestic pig frequently. Are food, warmth and exercise the controlling factors ? For sexual appetite accompanies satiety. Again, the same species of animals bear once in some places and many times in others ; for instance, in Magnesia and Libya sheep bear twice. The long period of gestation is the reason, for nothing feels craving when it is satisfied, just as what is full does not desire food. The creature craves for mating less during the period of gestation, because no purgation occurs during that time.

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30 Διὰ τί τῶν ἀνθρώπων οἱ ἀραιούς ἔχοντες τοὺς 48
 ὀδόντας βραχύβιοι ὡς ἐπὶ τὸ πολὺ; ἢ ὅτι σημεῖον
 τοῦ τὸ ὀστοῦν πυκνὸν εἶναι, ὡς ὁ ἐγκέφαλος
 ἀσθενῆς οὐκ εὐπνοῶν, ὥστε ὑγρὸς ὢν τὴν φύσιν
 ταχὺ σήπεται; καὶ γὰρ τὰ ἄλλα μὴ κινούμενα
 35 καὶ ἀπατμίζοντα. διὸ καὶ ἄνθρωπος τὴν κεφαλὴν
 δασύτατον, καὶ τὸ ἄρρεν τοῦ θήλεος μακροβιώτερον
 διὰ τὰς ραφάς. δεῖ δὲ ἰδεῖν καὶ ἐπὶ τῶν ἄλλων.

Διὰ τί δὲ ὅσοι τὴν διὰ τῆς χειρὸς τομὴν ἔχουσι 49
 δι' ὅλης, μακροβιώτεροι; ἢ διότι τὰ ἀναρθρα
 896 b βραχυβιώτατα, ὡς τὰ ἔνυγρα; εἰ δὲ τὰ ἀναρθρα
 βραχύβια, δῆλον ὅτι τὰ ἠρθρωμένα τοῦναντίον.
 τοιαῦτα δὲ ὢν καὶ τὰ φύσει ἀναρθρα μάλιστα
 ἠρθρωται· τῆς δὲ χειρὸς τὸ εἶσω ἀναρθρότατον.

5 Διὰ τί τῶν ζώων ἄνθρωπος ἢ μόνον ἢ μάλιστα 50
 διαστρέφεται; ἢ ὅτι ἢ μόνον ἢ μάλιστα ληπτὸν
 ἐν τῇ νηπιότητι γίνεται, ὅτε καὶ διαστρέφεσθαι
 συμβαίνει πᾶσιν;

Διὰ τί τῶν ζώων ἄνθρωπος μάλιστα καπνίζεται; 51
 ἢ ὅτι μάλιστα δακρύνει, ἢ δὲ κάπνισις μετὰ δα-
 κρύου;

10 Διὰ τί ἵππος ἵππῳ χαίρει καὶ ἐπιθυμεῖ, ἄνθρωπος 52
 δὲ ἀνθρώπῳ, καὶ ὅλως δὲ τὰ συγγενῇ τοῖς συγ-
 γενέσι καὶ ὁμοίοις; οὐ γὰρ δὴ ὁμοίως ὄτιοῦν¹
 ζῶον καλόν, ἢ δὲ ἐπιθυμία τοῦ καλοῦ. ἔδει οὖν
 τὸ καλὸν ἡδιον εἶναι. νῦν δὲ μάλλον οὐ πᾶν κάλλος
 15 ἡδύ,² οὐδὲ πᾶσιν <ὁμοίως> ἢ ἡδονὴ ἢ τὸ καλὸν
 ἡδύ, οἷον φαγεῖν ἢ πιεῖν ἐστὶν ἡδιον ἑτέρῳ καὶ
 ἀφροδισιάσαι ἄλλῳ. διότι μὲν οὖν ἕκαστον τῷ

¹ ὄτιοῦν Platt: ὅτι πᾶν Kuelle.

² Omitting with Forster τὸ καλὸν καὶ τὸ ἡδύ after κάλλος ἡδύ and adding <ὁμοίως>.

Why are men with porous teeth usually short- 48
lived? ^a Is it because this is a sign of the bone being
thick, for the brain, if no air reaches it, is weak, so
that, being moist, it naturally decays quickly? For
everything that admits of neither movement nor
evaporation decays. That is why man has a hairy
head, and why the male lives longer than the female
because of the sutures. But we must consider the
problem (*i.e.* longevity) in other cases.

Why are those that have a line right across the hand 49
long-lived? Is it because badly articulated animals,
for example, water animals, are short-lived? If the
badly articulated animals are short-lived, it is obvious
that the well articulated must be the opposite. Now
the latter are those in which the parts which are
naturally badly articulated are best articulated, and
the inside of the hand is the least well articulated part.

Why does man alone squint or at least to the 50
greatest extent of all creatures? Is it because he
exclusively or at least to the greatest extent is liable
to apoplexy in infancy, which is the time at which
squinting is always contracted?

Why is man of all animals the most affected by 51
smoke? Is it because he weeps most, and tears are
produced by smoke?

Why does a horse enjoy and desire a mare, a man 52
a woman, and generally speaking related creatures
desire their kin and creatures like themselves? For
it is not true that every living creature is equally
beautiful, and desire is for beauty. So the more
beautiful should be the more desirable. But rather
in fact not every beauty is pleasant, nor is pleasure
and beauty equally pleasant to all men; for instance,
one man finds eating and drinking more pleasant,
another sexual indulgence. So the question why each

^a Cf. Bk. XXXIV. 1.

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συγγενεῖ μιγνύμενον μάλιστα καὶ ἥδιστα ἀφρο-
 δισιάζει, ἄλλο πρόβλημα· ὅτι δὲ καὶ κάλλιστον,
 οὐκ ἔστιν ἀληθές. ἀλλὰ ἡμεῖς τὸ εἰς τὴν συνουσίαν
 20 ἡδὺ οἰόμεθα καλόν, ὅτι ἐπιθυμοῦντες. χαίρομεν
 ὄρωντες. καίτοι καὶ ἐπὶ τῶν ἄλλων ἐπιθυμιῶν
 ἔχει ὁμοίως· διψῶντες γὰρ ἥδιον ὄρωσι τὸ πόμα.
 τὸ μὲν οὖν πρὸς χρείαν τινὰ καλόν, οὗ καὶ μάλιστα
 ἐπιθυμοῦμεν, τοῦτο δοκεῖ ἥδιστον εἶναι, τὸ δὲ
 καθ' αὐτὸ οὐκέτι οὕτως. σημεῖον δὲ τούτου· δο-
 25 κοῦσι γὰρ ἡμῖν καὶ ἄνδρες καλοὶ εἶναι, <οὐ>¹ πρὸς
 τὴν συνουσίαν βλέψασιν. ἄρ' οὖν οὕτως ὥστε
 καὶ ἡσθῆναι ὄρωσι μᾶλλον τῶν εἰς συνουσίαν;
 οὐδέν γε κωλύει, εἰ μὴ ἐπιθυμοῦντες τύχοιμεν.
 οὕτω δὲ πόμα κάλλιον· εἰ γὰρ διψῶντες τύχοιμεν,
 ἥδιον ὀψόμεθα.

Διὰ τί ποτε τοῦ μὲν ἀνθρώπου τὰ ἔμπροσθεν 53
 30 δασύτερα τῶν ὀπισθέν ἐστι, τῶν δὲ τετραπόδων
 τὰ ὀπισθεν; ἢ ὅτι πάντα τὰ δίποδα τὰ ἔμπροσθεν
 ἔχει δασύτερα; οἱ γὰρ ὄρνιθες τὸν αὐτὸν τρόπον
 τοῖς ἀνθρώποις ἔχουσιν. ἢ τὰ ἀσθενέστερα μᾶλλον
 αἰεὶ σκεπάζειν ἢ φύσις εἴωθεν, ἀσθενὲς δὲ ἕκαστόν
 ἐστὶ τινὰ τρόπον; τῶν δὲ τετραπόδων ἀπάντων
 35 τὰ ὀπισθεν ἀσθενέστερά ἐστι τῶν ἔμπροσθεν διὰ
 τὸν τόπον· ὑπὸ γὰρ τῶν ψυχῶν καὶ καυμάτων
 μᾶλλον δυνατὰ ἐστι πάσχειν· τῶν δὲ ἀνθρώπων
 τὰ ἔμπροσθεν ἀσθενέστερά ἐστι καὶ τὸ αὐτὸ
 πέπονθεν.

897 a Διὰ τί ἄνθρωπος μάλιστα τῶν ζώων πτάρνυται; 54
 ἢ ὅτι καὶ κορυζᾷ μάλιστα; τούτου δ' αἰτιόν ἐστιν

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¹ <οὐ> added by Sylburg.

mates preferably with its kin and derives the greatest pleasure from it is another question. It is untrue to say that it is because its kin is most beautiful. But we regard as beautiful that which pleases us for sexual intercourse, because when we see it we enjoy the feeling of desire. Moreover, in other desires the position is similar ; for when we are thirsty we regard drink as more pleasant. We regard then as pleasantest that which is beautiful for a particular purpose for which we have a great desire, but the position is different with that which is beautiful in itself. There is proof of this ; for even men appear to us to be beautiful without any question of sexual relations. Can they be so beautiful as to give us more pleasure than those whom we regard from the point of view of intercourse ? There is nothing to prevent this, if we do not happen to feel desire at the time. In the same way a drink may be more beautiful ; if we happen to be thirsty we shall regard it as more pleasant.

Why in the case of man is the front of the body 53 more hairy than the back, but in four-footed beasts the back ? Is it because all two-legged creatures are more hairy in the front ? For birds show the same characteristic as men. Or is it that Nature is prone to shield the weaker parts more, and each part is weak in one way or another ? For in the four-footed animals the hind parts are weaker than the fore parts because of their position, for they can suffer more from both cold and heat. But the fore parts of man are weaker and the same happens to them.

Why does man sneeze more than other creatures ? 54
Is it because he suffers most from catarrh ? The reason for this is that, as heat exists in the region

897^a ὅτι τοῦ θερμοῦ ὄντος περὶ τὴν καρδίαν καὶ πεφυ-
κότος ἄνω φέρεσθαι τοῖς μὲν ἄλλοις ζώοις ἢ κατὰ
5 βύσιν αὐτοῦ φορά ἐστὶν ἐπὶ τοὺς ὤμους, ἐντεῦθεν
δὲ ἐξ ἀνακλάσεως σχιζόμενον τὸ μὲν ἐπὶ τὸν
τράχηλον καὶ τὴν κεφαλὴν φέρεται αὐτοῦ, τὸ δὲ
εἰς τὴν ράχιν καὶ τὴν ὀσφύν, διὰ τὸ ἐπὶ τῆς αὐτῆς
εὐθείας εἶναι πάντα ταῦτα καὶ παρὰ τὴν βάσιν.
φερόμενον δὲ ὁμοίως τὸ θερμόν¹ καὶ τὰ ὑγρά μερίζει
10 εἰς αὐτὰ ὁμαλῶς· ἔπεται γὰρ τὰ ὑγρά τῷ θερμῷ.
διὸ οὐδὲ πάνυ κορυζᾷ τὰ τετράποδα ζῶα, οὐδὲ
πτάρνυται· ὁ γὰρ πταρμὸς ἢ πνεύματος ἀθροῦ
φορά ἐστὶν, ὑγρῶν ἐξατμιζόντων τι μᾶλλον τοῦ
σώματος, ἢ ὑγρῶν ἀπέπτων. διὸ πρὸ τῶν κατάρ-
ρων γίνεται, ἃ οὐ συμβαίνει τοῖς ἄλλοις ζώοις, διὰ
15 τὸ τὴν τοῦ θερμοῦ φορὰν ὁμαλίζειν ἐν αὐτῷ εἰς τὸ
πρόσθεν καὶ ὀπισθεν. τοῦ τε ἀνθρώπου πρὸς ὀρθῇ
πεφυκότος τῇ βάσει, καθάπερ τὰ φυτά, συμβαίνει
τοῦ θερμοῦ φορὰν ἐπὶ τὴν κεφαλὴν γίνεσθαι
πλείστην καὶ σφοδροτάτην. φερόμενόν τε ἐν-
ταῦθα ἀραιοῖ καὶ θερμαίνει τοὺς περὶ αὐτὴν πόρους.
20 ὄντες δὲ τοιοῦτοι δεκτικοὶ γίνονται τῶν ὑγρῶν
μᾶλλον ἢ οἱ κάτω τῆς καρδίας πόροι. ὅταν οὖν
συμβῇ ἐξυγρασθῆναι μᾶλλον τοῦ δέοντος καὶ
καταψυγῆναι, ἔξωθεν συμβαίνει τὸ θερμόν, τροφήν
τε ἔχον καὶ συστέλλόμενον ἐντός, αὔξεσθαι, αὔξα-
νόμενον δὲ φέρεσθαι ἐπὶ τὴν κεφαλὴν καὶ τοὺς ἐν
25 αὐτῇ πόρους· εἰς οὓς ἀκολουθοῦντα τὰ ὑγρά, ὄντα
λεπτὰ καὶ ἀπεπτα, πληροῖ αὐτοὺς καὶ τοὺς κατάρ-
ρους ποιεῖ, καὶ πταρμοὺς ὁμοίως. ἐν γὰρ ταῖς
ἀρχαῖς τῶν κατάρρων τὸ θερμόν προαναφερόμενον
τοῦ ὑγροῦ, καὶ πνευματοῦν τοὺς πόρους, τῇ τ'

¹ θερμόν Bonitz: σῶμα Ruelle.

of the heart and heat naturally travels upwards, in the case of other animals it naturally travels to the shoulders ; from this point, dividing by refraction, part travels to the neck and head, and part to the spine and loin, because all these are in a straight line and in its path. Now as the heat travels it distributes the moisture to all parts alike ; for the moisture follows the heat. Consequently the four-footed animals do not suffer at all from catarrh nor sneeze : for sneezing is the passage either of collected air, when the moisture in the body gives off more vapour, or of unconcocted moisture. So sneezing precedes a cold in the nose, which does not occur in other animals, because the passage of the heat becomes divided between the fore and hind parts. But since man, like plants, is made by nature for an erect position, the passage of the heat to the head is very great and violent. During its passage thither it rarefies and heats the channels about it. Their nature being what it is, they are more receptive of moisture than the channels of the heart below. When, therefore, they become more full of moisture and more chilled than they should be, the external heat, having nourishment and being confined within, grows, and as it grows is carried to the head and to the channels therein : the moisture follows into them, being light and unconcocted, and fills them and causes catarrh, and likewise sneezing. For at the beginning of the catarrh the heat precedes the moisture and aerates the channels,

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ἐκβολῇ τοῦ πνεύματος τοὺς πταρμούς ποιεῖ καὶ
 30 τῇ τῶν ὑγρῶν¹ ἀναγωγῇ, ἃ ἔστι λεπτὰ καὶ
 δριμέα. διὸ καὶ συμβαίνει μετὰ τῶν τῆς κορυζῆς
 πταρμῶν ὑδατώδη ἀπομύττεσθαι. πάντων δὲ τού-
 των ὀρμησάντων τὰ συνεχῆ καὶ πάχος² ἔχοντα
 ὑγρά ἐφίσταται αὐτοῖς, καὶ ἐμφράττει τοὺς περὶ
 τὴν κεφαλὴν καὶ τὴν ῥίνα πόρους· ὀγκηρότερα γὰρ
 35 γινόμενα καὶ διατείνοντα ποιεῖ τοὺς περὶ τὴν
 κεφαλὴν πόρους. σημεῖον δὲ τὸ μήτ' ἐκτὸς ἢ
 δι' αὐτῶν πνεῦμα ἀφεῖσθαι. διὸ οὔτε πτάρνυνται
 οὔτε ὀσφραίνονται οἱ κορυζῶντες. οἱ δὲ ἄνευ
 κορυζῆς γινόμενοι διὰ μὲν τὰς αὐτὰς αἰτίας γίνον-
 ται, μικρὰς δὲ καὶ ἐλαφρὰς ἀρχὰς λαβόντες. ὥστε
 897 b συναχθέντα τὰ ὑγρά τῷ θερμῷ, ἐκπνευματούμενα
 ὑπ' αὐτοῦ δι' ὀλιγότητα, εἰσπίπτει κατὰ τὰς ῥίνας.
 ποιεῖ δὲ τὸν ψόφον τοῦ πνεύματος οὐχ ἦττον ἢ βία
 τῆς φορᾶς ἢ τὸ πλῆθος αὐτοῦ. ἐνεχθέντος γὰρ τοῦ
 5 θερμοῦ πρὸς ὀρθὴν πρὸς τὸν ἐγκέφαλον καὶ προσ-
 πεσόντος αὐτῷ, ἀνακλᾶται ἐπὶ τὰς ῥίνας διὰ τὸ
 τοὺς ταύτη πόρους ἐκτὸς ἀπὸ τοῦ ἐγκεφάλου
 διατείνειν. παρὰ φύσιν οὖν τῆς ἐκ τῆς κλάσεως
 φορᾶς γινομένης ἐπὶ τὰς ῥίνας τῷ πνεύματι,
 σφοδρὰν συμβαίνει γίνεσθαι· διὸ ποιεῖ τοὺς ψόφους.
 10 τῶν δὲ ἄλλων ζῶων συμβαίνει μάλιστα κορυζᾶν
 τοὺς ὄρνιθας διὰ τὸ μάλιστα ὁμοιόσχημον εἶναι
 ἀνθρώπῳ· ἦττον δὲ ἢ ἄνθρωπος πάσχει αὐτό, ὅτι
 τὰ πολλὰ κάτω ἔχει τὴν κεφαλὴν διὰ τὸ τὴν νομὴν
 ἀπὸ τῆς γῆς εἶναι.

Διὰ τί τὰ θαλάττια ζῶα τῶν ἐν τῇ γῇ μείζω καὶ 55
 15 εὐτραφέστερά ἐστιν; ἢ ὅτι ὁ ἥλιος καταδαπανῶν
 τὰ περιέχοντα τὴν γῆν ἀφαιρεῖται τὴν τροφήν;

and by the expulsion of the breath and the withdrawal of the moisture, which is light and acid, it causes sneezing. So it happens that beside the sneezing due to the catarrh a watery matter is wiped off. When all these are in motion the continuous and solid moisture follows, and blocks the passages about the head and nose : as these swell and expand they cause pains in the head. That the passages are blocked is proved by the fact that the breath cannot pass through them to the outside. So those with a cold in the head neither sneeze nor smell. A sneeze which occurs without a nasal discharge is due to the same causes, but has only a slight and unimportant origin. So that the moisture being collected by the heat, being vaporized by it because there is little of it, is poured down the nostrils. The force with which the breath travels is as much the cause of the sound as its quantity. For when the heat is carried vertically to the brain and attacks it, it is diverted to the nostrils because the channels in this region radiate outwards from the brain. As, then, the passage for the breath is diverted unnaturally to the nostrils, it becomes violent. Hence it makes a noise. Of other animals birds suffer most from nasal catarrh because they are formed most like men, but they suffer from this trouble less than men, because as a general rule they keep their heads down because their food is derived from the ground.

Why are marine animals larger and better nourished 55 than those on land? Is it because the sun using up the surface of the earth extracts the nourishment?

¹ *πρὸ* before *τῶν ὑγρῶν* omitted by Forster.

² *πάχος* Forster from Th. G. : *πάθος* Ruelle.

897^b διὸ καὶ τὰ κατακεκλειμένα εὐτραφέστερά ἐστιν.
πάντων οὖν τούτων ἀπήλλακται τὰ θαλάττια ζῶα.

Διὰ τί ποτε τὰ μὲν ἄλλα ζῶα πλεονάκεις τὴν 56
20 ξηρὰν τροφήν ἢ τὴν ὑγρὰν προσάγεται, ὁ δὲ
ἄνθρωπος τὴν ὑγρὰν ἢ τὴν ξηρὰν; ἢ διότι φύσει
ὁ ἄνθρωπος θερμότατον; πλείστης οὖν καταψύξεως
δεῖται.

Διὰ τί οἱ εὐνοῦχοι οὐ γίνονται φαλακροί; ἢ ὅτι 57
πολὺν ἔχουσι τὸν ἐγκέφαλον; τοῦτο δὲ συμβέβηκεν
25 αὐτοῖς διὰ τὸ μὴ συγγίνεσθαι ταῖς γυναιξίν· ἢ γὰρ
γονή ἐστὶν ἀπὸ τοῦ ἐγκεφάλου χωροῦσα διὰ τῆς
ράχεως. διὰ τοῦτο δ' οὖν δοκοῦσι καὶ οἱ βόες οἱ
ἐκτομῖαι μεγάλα τὰ κέρατα ἴσχειν, ὅταν ἐκ-
τμηθῶσιν. δοκεῖ δὲ ἢ αὐτὴ αἰτία εἶναι καὶ ὅτι
αἱ γυναῖκες καὶ οἱ παῖδες οὐκ εἰσὶ φαλακροί.

30 Διὰ τί τὰ μὲν εὐθὺς δύνανται δι' αὐτῶν τρέφεσθαι 58
μετὰ τὴν γένεσιν, τὰ δὲ οὐ; ἢ ὅσα ὀλιγοχροσιώτερα
τῶν μνήμης δεκτικῶν; διὸ ἅπαντα καὶ τελευτᾶ
θᾶπτον.

Διὰ τί ποτε ὁ μὲν ἄνθρωπος πλείω τὴν ὑπο- 59
χώρησιν ποιεῖται τὴν ὑγρὰν τῆς ξηρᾶς, οἱ δὲ ἵπποι
35 καὶ οἱ ὄνοι τὴν ξηρὰν; ἢ διότι ταῦτα μὲν τὰ ζῶα
πλείονι τροφῇ χρῆται τῇ ξηρᾷ, ὁ δὲ ἄνθρωπος ὑγρᾷ
μᾶλλον ἢ τῇ ξηρᾷ; πᾶσα δὲ περίπτωσις ἀπὸ τῆς
τροφῆς ἐστὶν καὶ ἀπὸ τῆς πλείονος πλείω. τὰ μὲν
οὖν τῇ ὑγρᾷ μᾶλλον, τὰ δὲ τῇ ξηρᾷ πλείονι τροφῇ
898^a χρῆται· διότι τὰ μὲν τῶν ζώων ἐστὶ φύσει ξηρά,
τὰ δὲ ὑγρά. τὰ μὲν οὖν τῇ φύσει ξηρὰ τῆς ὑγρᾶς
μᾶλλον ἐπιθυμεῖ (ταύτης γὰρ ἐνδεέστερά εἰσιν), τὰ
δὲ φύσει ὑγρά τῆς ξηρᾶς· ταύτης γὰρ ἐνδεέστερα
καθέστηκεν.

Διὰ τί ὄρνιθες καὶ ἄνθρωποι καὶ τῶν ζώων τὰ 60

This is why animals enclosed in the earth are better nourished. The marine animals are freed from all this.

Why do the other animals more often take dry 58 food than wet, but man more wet than dry? Is it because man is naturally the hottest animal? So he needs the most frequent cooling.

Why do not eunuchs grow bald? Is it because they 57 have a large amount of brain matter? This happens because they have no association with women; for the semen comes down from the brain through the spine. This appears to be the reason why castrated bulls grow large horns after they have been castrated. It appears to be for the same reason that women and children are not bald.

Why can some creatures feed themselves imme- 58 diately after birth, while others cannot? Are those who can do so the shorter-lived among the animals which are capable of memory? This is why they all die earlier.

Why does man have more moist excrement than 59 dry, while horses and asses have more dry? Is it because these animals eat more dry food, but man consumes more liquid than dry food? But all waste product arises from food and the more from the larger quantity of food. Some animals, then, consume more liquid food, others more dry: the other reason is that the former are naturally more dry, the latter more moist. Those which are dry by nature desire wet food more (for they are more lacking in it), but those which are naturally wet desire dry food; for they need it more.

Why are men and birds and all courageous creatures 60

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δ ἀνδρεία σκληρότερα; ἢ ὅτι ὁ θυμὸς μετὰ θερμότητος; ὁ γὰρ φόβος κατάψυξις. ὅσων οὖν τὸ αἷμα ἐνθερμόν ἐστιν, καὶ ἀνδρεία καὶ θυμοειδῆ· τὸ δὲ αἷμα τροφή. ὅσα δὲ θερμῶ ἄρδεται τῶν φυομένων σκληρότερα πάντα.

Διὰ τί τέρατα τίκτουσιν μάλιστα τὰ τετράποδα 61
 10 τὰ μὴ μεγάλα, ἄνθρωπος δὲ καὶ τὰ μεγάλα ἦττον, οἷον ἵπποι καὶ ὄνοι; ἢ ὅτι πολύγωνα ταῦτα, οἷον κύνες καὶ ὕες καὶ αἶγες καὶ πρόβατα, πολὺ μᾶλλον τῶν μεγάλων, ἐκείνων δὲ τὰ μὲν ὅλως μονοτόκα, τὰ δὲ ὡς ἐπὶ τὸ πολὺ. τὰ δὲ τέρατα γίνεται ἐπ-
 15 αλλαπτόντων τῶν σπερμάτων ἀλλήλοις καὶ συγχεομένων ἐν τῇ ἐξόδῳ τῆς γονῆς ἢ ἐν τῇ μίξει τῇ ἐν τῇ ὑστέρα τῆς θηλείας. διὸ καὶ ὄρνιθες αὐτὰ ποιοῦσιν· τὰ γὰρ ὡὰ δίδυμα τίκτουσι, τὰ δὲ τέρατα ἐκ τῶν διδύμων γίνεται, ὧν ἢ λέκιθος τῷ ὑμένι οὐ διαιρεῖται.

20 Διὰ τί ἡ κεφαλὴ δασεῖα τῶν ἀνθρώπων μᾶλλον 62 τοῦ ἄλλου σώματος καὶ οὐ κατὰ λόγον, τοῖς δὲ ἄλλοις ζώοις τούναντίον; ἢ ὅτι καὶ τῶν ἄλλων τὰ μὲν εἰς ὀδόντας ἐκδίδωσιν καθ' ὑπερβολὴν τῆς τροφῆς, τὰ δὲ εἰς κέρατα, τὰ δὲ εἰς τρίχας; ὅσα
 25 μὲν εἰς κέρατα, ἦττον τὴν κεφαλὴν ἔχει δασεῖαν· ἐκεῖ γὰρ ἀνήλωται· ὅσα δὲ εἰς ὀδόντας μᾶλλον μὲν τῶν κερατοφόρων (ἔχει γὰρ λοφιάν), ἦττον δὲ τῶν τοιούτων, οἷον ὀρνέων. ἔχουσιν γὰρ ταῦτα καὶ τὴν τῶν ἀνθρώπων· ὁ ἐκείνοις πολλαχῆ δια πλῆθος, τούτῳ¹ εἰς κεφαλὴν ἐκδίδωσιν· οὐδὲ γὰρ οὐδὲν ἔχει,
 30 οὐδὲ πολὺ οὕτως ὥστε πανταχῆ.

hard? Is it because courage is associated with heat? For fear is a process of chilling. Those, then, whose blood is hot, are manly and courageous, for blood is their food; in the same way plants watered with warm water become harder.

Why do small four-footed animals more often bear 61 abnormal offspring, but men and large animals, such as horses and asses, less often? Is it because the former, such as dogs, pigs, goats and sheep, have many offspring more often than the large animals which have only one, either invariably or usually? Monsters occur when the semen is mixed together and confused either on its exit from the male or in a later mixing in the female. So birds produce abnormal offspring, for they produce twin eggs, and abnormalities are produced from twin eggs, in which the yoke is not separated from the membrane.

Why is a man's head more hairy than the rest of 62 the body and not in proportion to it, whereas it is just the opposite with other animals? Is it because among the other animals some contribute an excess of nourishment to the teeth, others to the horns, and others again to the hair? Those that use it for the horns have less hairy heads, for the nourishment is expended on the horns; those which expend the nourishment on the teeth have more hair than horned animals (for they have a mane), but less than such creatures as birds. They have the same elements as men.^a But whereas in animals it is distributed everywhere because of its quantity, in men it goes to the head; for man neither lacks all such nourishment, nor has sufficient for it to travel in every direction.

^a The reading here is meaningless and suggested emendations unsatisfactory.

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Διὰ τί ἄνθρωπος μόνος τῶν ζώων πολιὰς ἔχει; 63
 ἢ ὅτι τὰ μὲν πλεῖστα τῶν ζώων ῥυάδα τὴν τρίχα
 ἀνὰ πᾶν ἔτος ἔχει, οἷον ἵππος, βοῦς, ἔνια δὲ ῥυάδα
 μὲν οὐκ ἔχει, βραχύβια δὲ εἰσιν, καθάπερ πρόβατον
 85 καὶ ἄλλα· οὐ ἢ θρίξ ὥσπερ οὐ γηράσκουσα οὐδὲ
 πολιοῦται. ὁ δὲ ἄνθρωπος οὐδὲ ῥυάδα ἔχει τὴν
 τρίχα, μακρόβιον τέ ἐστιν, ὥστε ὑπὸ τοῦ χρόνου
 πολιοῦται.

898 b Διὰ τί, ὅσοις τὰ ἀπὸ τοῦ ὀμφαλοῦ κάτω μείζονα 64
 ἢ τὰ πρὸς τὰ στήθη, βραχύβιοι καὶ ἀσθενεῖς; ἢ
 ὅτι ἢ κοιλία ψυχρὰ διὰ μικρότητα, ὥστε οὐ
 πεπτική, ἀλλὰ περιττωματική; οἱ δὲ τοιοῦτοι
 νοσακεροί.

Διὰ τί τὰ μὲν γίνεται τῶν ζώων οὐ μόνον ἐξ 65
 5 ἀλλήλων, ἀλλὰ καὶ αὐτόματα, τὰ δ' ἐξ ἀλλήλων
 μόνον, οἷον ἄνθρωπος καὶ ἵππος; ἢ κἂν εἰ καὶ μὴ
 δι' ἑτέρας αἰτίας, ἀλλ' ὅτι τοῖς μὲν ὀλίγος ὁ
 χρόνος τῆς γενέσεως, ὥστε ἢ γεννητικὴ ὥρα
 (οὐχ) ὑπερτείνει καὶ ἐνδέχεται γενέσθαι ἐν τῇ
 μεταβολῇ τῶν ὥρῶν, τῶν δὲ πολὺ ἢ γένεσις ὑπερ-
 10 τείνει· ἔνιαύσιοι γὰρ ἢ δεκάμηνοί εἰσιν· ὥστε
 ἀνάγκη * * γίνεσθαι ἢ ἐξ ἀλλήλων γίνεσθαι.

Διὰ τί τῶν Αἰθιοπῶν οἱ μὲν ὀδόντες λευκοί, καὶ 66
 λευκότεροι ἢ τῶν ἄλλων, οἱ δὲ ὄνυχες οὐκέτι; ἢ
 οἱ μὲν ὄνυχες, ὅτι καὶ τὸ δέρμα μέλαν, καὶ μελάν-
 15 τερον ἢ τῶν ἄλλων, οἱ δὲ ὄνυχες ἐκ τοῦ δέρματος
 φύονται. οἱ δὲ ὀδόντες λευκοὶ διὰ τί; ἢ ὅτι ἐξ
 ὧν τὸ ὑγρὸν ἐξάγει ὁ ἥλιος ἄνευ τοῦ ἐπιβάπτειν,
 λευκαίνεται, οἷον καὶ τὸν κηρόν; τὸ μὲν οὖν
 δέρμα ἐπιβάπτει, τοὺς δὲ ὀδόντας οὐκ ἐπιβάπτει,
 ἀλλὰ τὸ ὑγρὸν διὰ τὴν ἀλέαν ἐξατμίζεται ἐξ
 αὐτῶν.

PROBLEMS, X. 63-66

Why does man alone of all animals have grey hair? 63
Is it because most animals' hair falls out every year, such as the horse and the ox, and others such as the sheep have no falling off of hair, but are short-lived: in this case the hair never as it were grows old and so does not turn grey? But man has no falling off of hair, and is long-lived, so that it grows grey in time.

Why are those with whom the distance below from 64 the navel is greater than towards the chest, short-lived and weak? Is it because the stomach is cold owing to its small size, so that it does not cause concoction, but is full of waste products? Such creatures are unhealthy.

Why are some living creatures produced not only 65 from each other, but also spontaneously, whereas some are only produced from each other, such as the man and the horse? Is there no other cause except that in some the time of gestation is short, so that the season of birth is not postponed and can occur during the change of seasons, but in others the birth is much prolonged; for the period is either a year or ten months; so that they must be born from intercourse with each other or not at all? ^a

Why do Ethiopians have white teeth—whiter in- 66 deed than other peoples—but not white nails? The nails are not white because the skin is black—black indeed than any other nation, and the nails grow from the skin. But why are the teeth white? Is it because from whatever the sun extracts moisture without tinting it becomes white, like wax? Now the sun does dye the skin, but not the teeth, but the moisture is evaporated from them owing to the heat.

^a The translation of the last sentence of this problem is supplied from Th. G. The Greek has an obvious lacuna.

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 20 Διὰ τί τὰ μὲν ἀφαιρουμένης τῆς κεφαλῆς ἀποθνή- 67
 σκει εὐθύς ἢ ταχύ, τὰ δὲ οὐ; ἢ ὅσα ἄναιμα καὶ
 ὀλιγότροφα, τοῦτο πάσχει; οὔτε τροφῆς γὰρ
 δεῖται ταχύ, οὔτε ἐγχεῖται αὐτῶν τὸ θερμὸν ἐν τῷ
 ὑγρῷ, ὧν ἄνευ οὐχ οἶόν τε ζῆν τοῖς ἐναίμοις. τού-
 25 τοις δὲ οἶόν τε ἐστίν· ἀπνευστὶ ζῆν γὰρ δύνανται
 πολὺ μᾶλλον. ἢ δὲ αἰτία ἐν ἑτέροις εἴρηται.

^a *De Resp.* 475 a 20 ff.

PROBLEMS, X. 67

Why do some creatures die immediately or soon 67 after their head is removed, whereas others do not? Is the behaviour of the latter due to the fact that they are bloodless and require but little nourishment? They neither need food immediately, nor is the heat in them expended in moisture, two factors without which the animals with blood cannot live. But the bloodless animals can, for they can live for a much longer time without breathing. The explanation of this has been given elsewhere.^a

ΙΑ

ΟΣΑ ΠΕΡΙ ΦΩΝΗΣ

898 b

Διὰ τί τῶν αἰσθήσεων ἐκ γενετῆς μάλιστα τὴν ἰ
ἀκοὴν πηροῦνται; ἢ ὅτι ἀπὸ τῆς αὐτῆς ἀρχῆς
30 εἶναι δόξειεν ἂν ἢ τε ἀκοὴ καὶ ἢ φωνή; ῥᾶστα
δὲ δοκεῖ διαφθείρεσθαι ἢ διάλεκτος οὔσα εἶδος
φωνῆς, καὶ χαλεπώτατα ἐπιτελεῖσθαι. σημεῖον δὲ
ὅτι μετὰ τὸ γενέσθαι πολὺν χρόνον ἐνεοί ἐσμεν· τὸ
μὲν γὰρ πρῶτον ὅλως οὐδὲ λαλοῦμεν οὐθέν, εἶτα
ὀψέ ποτε ψελλίζομεν. διὰ τε τὸ τὴν διάλεκτον
35 εὐφθαρτον εἶναι, τὴν αὐτὴν δὲ ἀρχὴν ἀμφοτέρων
εἶναι καὶ τῆς διαλέκτου (φωνὴ γάρ τις) καὶ τῆς
ἀκοῆς ὡσπερ καὶ ἐκ¹ συμβεβηκότος, ῥᾶστα τῶν
αἰσθήσεων φθείρεται καὶ οὐ καθ' αὐτὴν ἢ ἀκοή.
τεκμήριον δὲ ἔστιν καὶ ἐκ τῶν ἄλλων ζώων λαβεῖν,
899 a ὅτι παντελῶς εὐφθαρτός ἐστιν ἢ ἀρχὴ τῆς δια-
λέκτου· λαλεῖ γὰρ οὐθέν τῶν ἄλλων ζώων πλὴν
ἀνθρώπου, καὶ οὗτοι δὲ ὀψέ ποτε, καθάπερ εἴρηται.

Διὰ τί οἱ κωφοὶ πάντες διὰ τῶν ῥινῶν φθέγ- 2
5 γονται; ἢ διὰ τὸ ἐγγὺς τοῦ ἐνεοῦς εἶναι; οἱ δὲ
ἐνεοὶ λαλοῦσι διὰ τῶν ῥινῶν· ταύτη γὰρ αὐτῶν
ἐκπίπτει τὸ πνεῦμα διὰ τὸ τῷ στόματι μεμυκέναι.
μεμύκασι δέ, ὅτι οὐθέν εἰς φωνὴν χρῶνται τῇ
γλώττῃ.

¹ ἐκ Forster: εἰ Ruelle.

BOOK XI

PROBLEMS CONNECTED WITH THE VOICE

WHY do those who suffer from birth from any defective sense mostly have bad hearing? Is it because both hearing and the voice may be held to arise from the same source? Now language, which is a kind of voice, seems the easiest thing to destroy and the most difficult to bring to perfection. There is evidence for this in the fact that after birth we are unable to speak for a long time, for at first we cannot talk at all, and then later for a time we falter in speech. But because language is easily destroyed, and the source is the same both of language (for it is a kind of voice) and of hearing, hearing is therefore the most easily destroyed of all the senses, not of itself but incidentally. We can find proof of this also from the other animals, that the origin of the language is quite easily destroyed, for none of the animals except man speaks, and man only does so after a time, as we have said.

Why do the deaf always speak through their nose? 2
Is it because deafness and dumbness are closely allied? Now the dumb make sounds through their noses, for the breath strikes through the nostrils because the mouth is closed. It is closed because they do not use the tongue to modulate the voice.

Διὰ τί μεγαλόφωνοι πάντες εἰσὶν οἱ θερμοὶ τὴν 3
 10 φύσιν; ἢ ὅτι ἀνάγκη καὶ ἀέρα πολὺν καὶ ψυχρὸν
 ἐν τούτοις εἶναι; ἔλκει γὰρ θερμὸν πνεῦμα πρὸς
 ἑαυτὸ καὶ ἀέρα, καὶ πλείω τὸ πλείον. ἢ δὲ μεγάλη
 φωνὴ γίνεται ἐν τῷ πολὺν ἀέρα κινεῖν, καὶ ὀξεῖα
 ἐν τῷ ταχέως· βαρεῖα δὲ ἢ ἐν τῷ βραδέως.

15 Διὰ τί οἱ κωφοὶ πάντες διὰ τῶν ῥινῶν φθέγ- 4
 γονται; ἢ διὰ τὸ βιαιότερον πνεῖν τοὺς κωφοὺς;
 ἐγγὺς γὰρ τοῦ ἐνεοῦ εἶναι εἰσὶν. δίσταται οὖν
 τῶν μυκτῆρων ὁ πόρος ὑπὸ τοῦ πνεύματος· οἱ
 τοιοῦτοι δὲ διὰ ῥινῶν φθέγγονται.

Διὰ τί εὐηκοώτερα τὰ τῆς νυκτός; ἢ ὅτι μᾶλλον 5
 20 ἡρεμία διὰ τὴν τοῦ θερμοτάτου ἀπουσίαν; διὸ καὶ
 ὡς ἐπὶ τὸ πολὺ ἀταρακτότερα. ὁ γὰρ ἥλιος ὁ κινῶν.

Διὰ τί πόρρωθεν αἱ φωναὶ ὀξύτεραι δοκοῦσιν 6
 εἶναι; οἱ γοῦν μιμούμενοι τοὺς σφόδρα πόρρω
 ὄντας καὶ βοῶντας ὀξὺ φθέγγονται καὶ ὅμοιον τοῖς
 25 ἀπηχοῦσιν, καὶ τῆς ἡχοῦς ὀξύτερος φαίνεται ὁ
 ψόφος. ἔστι δὲ πόρρω· ἀνακλᾶται γάρ. οὐκοῦν
 ἐπεὶ ὀξὺ μὲν ἐν ψόφῳ τὸ ταχύ, βαρὺ δὲ τὸ βραδύ,
 ἔδει βαρυτέρας πόρρωθεν φαίνεσθαι τὰς φωνάς.
 τὰ γὰρ αὐτὰ φερόμενα πάντα βραδύτερον φέρεται
 ὅσω ἂν ἀπέχη τῆς ἀρχῆς πλείον, καὶ τέλος πίπτει.
 30 πότερ' οὖν ὅτι οἱ μιμούμενοι ἀμενηνῇ τῇ φωνῇ
 μιμοῦνται καὶ λεπτῇ¹ τὴν πόρρωθεν φωνήν; λεπτὴ
 δὲ βαρεῖα οὐκ ἔστιν, οὐδὲ μικρὸν καὶ ἀμενηνὸν
 φθέγγεσθαι βαρὺ, ἀλλ' ὀξὺ ἀνάγκη. ἢ οὐ μόνον
 οἱ μιμούμενοι διὰ τοῦτο μιμοῦνται, ἀλλὰ καὶ οἱ
 ψόφοι αὐτοὶ ὀξύτεροι γίνονται; αἴτιον δὲ ὅτι ὁ
 35 ἀῆρ ὁ φερόμενος ποιεῖ τὸν ψόφον· καὶ ὥσπερ τὸ
 πρῶτον ψοφεῖ τὸ κινήσαν τὸν ἀέρα, οὕτω δεῖ πάλιν

¹ λεπτῇ Forster: λεπτήν Ruelle.

PROBLEMS, XI. 3-6

Why are the warm by nature always loud-voiced? 3
Is it because there must be much cold air in them?
For the hot breath attracts the air to itself, the more
so the hotter it is. But a loud voice occurs when much
air is moved, a shrill voice when the movement is
quick, and a deep voice when the movement is slow.

Why do the deaf all speak through their noses? 4
Is it because the deaf breathe more violently? For
they are near to being dumb. The passage through
the nostrils is therefore distended by the breath, and
such people speak through their noses.

Why are sounds easier to hear at night? Is it 5
because everything is quieter owing to the absence
of great heat? Generally speaking, therefore, there
is less disturbance. For the sun is the moving force.

Why do voices heard at a distance sound more 6
shrill? For example, imitators of those shouting
from a great distance speak shrilly like those causing
an echo, and the sound of an echo seems shriller. But
it is at a distance, for the sound is refracted. Hence,
since the swift in sound is shrill, and the slow is deep,
voices at a distance ought to sound lower. For
travelling bodies all move more slowly in proportion
to their distance from the source and ultimately fall.
Is it because those who imitate the voice at a distance
do so with a feeble and light voice? But a light voice
cannot be low, nor can a feeble and light voice sound
low, but must sound shrill. Or is it not merely that
the imitator imitates in this way, but that the sounds
are actually shriller? The reason is, that the travel-
ling air causes the sound, and, just as the first impulse
that moves the air causes the sound, so the air must

899 a ποιῆσαι τὸν ἀέρα, καὶ ἄλλον κινουῦντα εἶναι, τὸν
 δὲ κινούμενον. διὸ ὁ ψόφος συνεχῆς, ὅτι ἀεὶ
 899 b ἐκδέχεται κινουῦντα κινῶν, ἕως ἂν ἀπομαρανθῆ, ὃ
 ἐπὶ τῶν σωμάτων ἐστὶ τὸ πεσεῖν, ὅταν μηκέτι
 δύνηται ὠθεῖν ὁ ἀήρ ἔνθα μὲν τὸ βέλος, ἔνθα δὲ
 τὸν ἀέρα. ἢ μὲν γὰρ φωνὴ γίνεται ἢ συνεχῆς
 ἀέρος ὠθουμένου ὑπ' ἀέρος, τὸ δὲ βέλος φέρεται
 3 σώματος ὑπ' ἀέρος κινουμένου. ἐνταῦθα μὲν οὖν
 ἀεὶ τὸ αὐτὸ φέρεται σῶμα, ἕως ἂν καταπέση, ἐκεῖ
 δὲ ἀεὶ ἕτερος ἀήρ. καὶ πρῶτον ἐλάττω θᾶπτον μὲν
 κινεῖται, ἐπ' ὀλίγον δέ. διὸ πόρρω ὀξύτεραι καὶ
 λεπτότεραι αἱ φωναί. τὸ γὰρ θᾶπτον ὀξύ, ὥσπερ
 καὶ διηπόρηται. ὥσπερ ἢ αὐτὴ αἰτία δι' ἣν καὶ
 10 οἱ μὲν παῖδες καὶ οἱ κάμνοντες ὀξὺ φθέγγονται, οἱ
 δὲ ἄνδρες καὶ οἱ ὑγιαίνοντες βαρὺ. τὸ δὲ τοῖς
 ἐγγὺς μὴ ἐπίδηλον εἶναι τὴν φωνὴν ἢ βαρυτέραν
 ἢ ὀξύτεραν γινομένην, καὶ ὅλως <τοῦ> μὴ ὁμοίως
 ἔχειν τοῖς ριπτουμένοις βάρεσιν, αἴτιον ὅτι τὸ μὲν
 ριφθὲν ἐν φέρεται ἀεὶ τὸ αὐτό, ὁ δὲ ψόφος ἀήρ
 15 ἐστὶν ὠθούμενος ὑπὸ ἀέρος. διὸ καὶ τὸ μὲν εἰς
 ἐν πίπτει, ἢ δὲ φωνὴ πανταχῆ, ὥσπερ ἂν εἰ τὸ
 ριφθὲν ἅμα φερόμενον ἀπείρως θρυφθείη, καὶ ἔτι
 εἰς τοῦπισθεν.

Διὰ τί αἱ νεηλιφεῖς οἰκίαι μᾶλλον ἤχοῦσιν; ἢ ἵ
 ὅτι μᾶλλον ἀνάκλασις γίνεται διὰ τὴν λειότητα;
 20 λειότεραι δὲ διὰ τὸ ἀρραγὲς καὶ τὸ συνεχές. δεῖ
 δὲ μὴ παντελῶς ὑγρὰν ἀλλ' ἤδη ξηρὰν λαμβάνειν.
 ἀπὸ πηλοῦ γὰρ οὐκ ἐστὶν ἀνάκλασις. διὰ ταῦτα
 δὲ καὶ τὰ κονιάματα μᾶλλον ἤχει. συμβάλλεται

PROBLEMS, XI. 6-7

in its turn do the same, so that the air is partly moving and partly moved? The sound is continuous because the moving air succeeds other moving air, until the impulse is exhausted, which in the case of solid bodies means that they fall, when the air is no longer able to push the missile in the one case and the air in the other. The voice, then, is continuous when air is pushed by air, but the missile travels when a solid body is pushed by the air. So in the one case the same body travels all the time until it falls, but in the other case it is different air which moves. At first smaller objects move more quickly, but over a short space. So voices at a distance are shriller and lighter. For what moves quickly is shrill, a problem which has been discussed before.^a The same cause explains why boys and sick persons have a shrill voice, but men and healthy people a deep one. The reason why it is not evident to those close at hand whether the voice is shrill or deep, and generally that the conditions are not the same as when heavy bodies are thrown, is that the object thrown is one and the same throughout, but sound is air continually pushed by air. Consequently the object thrown falls on one spot, but the voice everywhere, as if the object thrown were broken in its course into atoms, and even travelled backwards.

Why do newly plastered houses echo more? Is it because there is more refraction of sound owing to the smoothness of the surface? The surface is smoother because it is unbroken and continuous. But we must try it not when it is quite wet, but when it is already dry; for there is no refraction of sound from wet clay. This is why stucco produces more echo.

^a 899 a 13.

δὲ ἴσως καὶ ἡ ἀκίνησις τοῦ ἀέρος· ἀθρόος γὰρ ὢν¹
μᾶλλον ἀποπλήττεται τὸν προσπίπτοντα.

25 Διὰ τί, ἐάν τις πίθον καὶ κεράμια κενὰ κατορύξῃ 8
καὶ πωμάσῃ, μᾶλλον ἤχει τὰ οἰκήματα, καὶ ἐὰν
φρέαρ ἢ λάκκος ἢ ἐν τῇ οἰκίᾳ; <ἢ> ὅτι ἐπεὶ ἀνά-
κλασις ἢ ἠχώ, δεῖ περιειλημμένον ἀθρόον εἶναι
τὸν ἀέρα, καὶ ἔχειν πρὸς ὃ ἀνακλασθήσεται, προσ-
πίπτων² πυκνὸν καὶ λεῖον; οὕτω γὰρ μάλιστα
30 ἠχος γίνεται. τὸ μὲν οὖν φρέαρ καὶ ὁ λάκκος ἔχει
τὴν στενότητα καὶ τὴν ἄθροισιν, οἱ δὲ πίθοι καὶ
τὰ κεράμια καὶ τὴν πυκνότητα τῶν περιεχόντων,
ὥστε ἐξ ἀμφοτέρων τὸ συμβαῖνον. καὶ γὰρ τὰ
κοῖλα μᾶλλον ἤχει· διὰ τοῦτο καὶ ὁ χαλκὸς μάλιστα
35 τῶν ἄλλων. ὅτι δὲ κατορωρυγμένα, οὐθὲν ἄτοπον·
ἢ γὰρ φωνὴ φέρεται κάτω οὐχ ἦττον. ὅλως δὲ
πανταχῇ δοκεῖ καὶ κύκλῳ φέρεσθαι.

Διὰ τί δὲ μᾶλλον, ἐὰν κατορύξῃ τις, ἤχει, ἢ ἐὰν 9
800 a μή; ἢ ὅτι περιστεγόμενα μᾶλλον εἰς αὐτὰ δέχεται
καὶ κατέχει τὸν ἀέρα; συμβαίνει δὲ καὶ τὴν
πληγὴν σφοδροτέραν γίνεσθαι.

Διὰ τί τὸ ὕδωρ τὸ ψυχρὸν ἐκ τοῦ αὐτοῦ ἀγγείου 10
b ἐκχεόμενον ὀξύτερον ποιεῖ τὸν ψόφον; ἢ ὅτι
θάπτων ἢ φορά; βαρύτερον γάρ. ἢ δὲ θάπτων
ὀξύτερον ποιεῖ τὸν ψόφον. τὸ δὲ θερμὸν καὶ τῇ
μανότητι καὶ τῇ ἀναφορᾷ κουφίζει. παρόμοιον
δὲ ὅτι καὶ αἱ δᾶδες καιόμεναι ἀσθενεστέραν τὴν
πληγὴν ποιούσιν.

10 Διὰ τί τοῖς ἠγρυπνηκόσιν ἢ φωνὴ τραχυτέρα; 11
ἢ διότι ὑγρότερον τὸ σῶμα διὰ τὴν ἀπεισίαν, καὶ
οὐχ ἠκιστα περὶ τὸν ἄνω τόπον, διὸ καὶ βάρος ἐν

¹ ὢν Forster : ἰὼν Ruelle.

² προσπίπτων Forster : προσπίπτον Ruelle.

PROBLEMS, XI. 7-11

Possibly the immobility of the air also contributes to the result ; for when the air is massed together it throws back what falls on it with more violence.

Why is it that if one buries a large jar or empty pot 8 with a lid on, the building echoes more, and also if there is a well or cistern in the house ? Is it because, since echo is refraction, the air must be compactly enclosed, and have something from which it can be refracted, when it strikes on what is thick and smooth ? For in these conditions the echo is most noticeable. So the well and the cistern combine the qualities of narrowness and compactness, but jars and pots have thickness in their sides, so that the same result occurs in both cases. For hollow bodies produce more echo ; and for this reason bronze produces more echo than other metals. It is not strange that this happens when they are dug in ; for the voice carries downwards no less than in any other direction. Generally speaking, it seems to be carried in all directions and in a circle.

Why do they echo more if they are dug in than if 9 they are not ? Is it because when covered up they receive the air better within and retain it ? Hence the blow is more violent.

Why does cold water make a shriller sound than 10 hot when poured out of the same vessel ? Is it because it comes out more quickly, since it is heavier ? And that which travels more quickly makes a shriller sound. Heat on the other hand lightens water by rarefying it and making it rise. Similar is the fact that torches when burning make a weaker blow.

Why is the voice rougher with those who have had 11 a sleepless night ? Is it because the body is moister owing to lack of concoction, and particularly in the upper parts, because of the weight in the head ; as

900 a

τῆ κεφαλῇ; ὑγρότητός τε περὶ τὸν βρόγχον οὔσης
ἀνάγκη καὶ τραχυτέραν εἶναι τὴν φωνήν. ἢ μὲν
15 γὰρ τραχύτης διὰ τὴν ἀνωμαλίαν, ἢ δὲ βαρύτης
διὰ τὴν ἔμφραξιν· βραδυτέρα γὰρ ἢ φορά.

Διὰ τί μετὰ τὰ σιτία τάχιστα ἀπορρήγνυται 12
ἢ φωνή; ἢ ὅτι κοπτόμενος μὲν ὁ τόπος ἐκ-
θερμαίνεται, θερμαινόμενος δὲ ἔλκει τὴν ὑγρότητα;
πλείων δὲ αὕτη καὶ ἐτοιμοτέρα διὰ τὴν προσ-
φοράν.

20 Διὰ τί οἱ κλαίοντες ὀξύ φθέγγονται, οἱ δὲ γε- 13
λῶντες βαρύ; ἢ ὅτι οἱ μὲν ὀλίγον κινούσι πνεῦμα
δι' ἀσθένειαν, οἱ δὲ σφοδρῶς, ὃ ποιεῖ ταχὺ φέρεσθαι
τὸ πνεῦμα; τὸ δὲ ταχὺ ὀξύ· καὶ γὰρ ἀπὸ συντόνου
τοῦ σώματος ριπτούμενον ταχὺ φέρεται. ὃ δὲ
25 γελῶν τοῦναντίον διαλελυμένος¹. οἱ δὲ ἀσθενεῖς
ὀξύ· ὀλίγον γὰρ ἀέρα κινούσιν· οἱ δὲ ἐπιπολῆς.
ἔτι οἱ μὲν γελῶντες θερμὸν τὸ πνεῦμα ἀφιασιν, οἱ
δὲ κλαίοντες, ὥσπερ καὶ ἡ λύπη κατάψυξις ἐστὶ
τοῦ τόπου τοῦ περὶ τὰ στήθη, καὶ τὸ πνεῦμα
ψυχρότερον ἀφιασιν. τὸ μὲν οὖν θερμὸν πολὺν
ἀέρα κινεῖ, ὥστε βραδέως φέρεσθαι, τὸ δὲ ψυχρὸν
30 ὀλίγον. συμβαίνει δὲ τοῦτο καὶ ἐπὶ τῶν αὐλῶν·
οἱ γὰρ θερμότερῳ τῷ πνεύματι αὐλοῦντες πολὺ
βαρύτερον αὐλοῦσιν.

Διὰ τί οἱ παῖδες καὶ τὰ ἄλλα τῶν ζώων τὰ νέα 14
ὀξύτερον φθέγγονται τῶν τελείων, καὶ ταῦτα τῆς
ὀξύτητος σφοδρότητος οὔσης; ἢ ἢ φωνή ἐστὶν
35 ἀέρος κίνησις, καὶ ἢ θάπτων ὀξυτέρα; ῥᾶον δὲ
καὶ θᾶπτον ὁ ὀλίγος τοῦ πολλοῦ κινεῖται ἀήρ.
κινεῖται δὲ ἢ συγκρινόμενος ἢ διακρινόμενος ὑπὸ
θερμοῦ. ἐπεὶ δὲ ἢ μὲν εἰσπνοή ἐστὶ ψυχροῦ εἰσ-
αγωγῆ, συγκρίνοιτ' ἂν ἐν αὐτῇ ὁ ἐν ἡμῖν ἀήρ· ἢ

¹ διαλελυμένος Richards : διαλελυμένως Ruelle.

PROBLEMS, XI. 11-14

there is moisture around the vocal chords the voice must be rougher? For roughness is due to unevenness, and a deep tone is due to obstruction; for the voice travels more slowly.

Why does the voice crack most easily after food? 12 Is it because that part of the body grows hot because it is frequently struck, and when heated it attracts the moisture; this moisture becomes more in quantity and more easily available owing to the application of food.

Why do those who weep speak in a shriller voice, 13 but those who laugh in a deep one? Is it because the latter through their weakness only move a little breath, but the former exhale violently, which makes the breath come fast? But speed involves shrillness; for that which is hurled from a body under strain travels fast. The laugher on the other hand is in a relaxed state. The weak make shrill sounds; for they move but little air, and sometimes only on the surface. Laughers also exhale hot breath, but those who weep (just as pain causes a chilling of the region about the chest) exhale a colder breath. Now heat moves much air, so that it travels slowly, but cold only a little. This also happens with pipes; for those who play with hotter breath pipe a much lower note.

Why do boys and other young animals speak on a 14 shriller note than the fully developed creature, and that too although shrillness implies violence? Is it because the voice implies movement of air, and the quicker it travels the shriller it is? A little air moves more easily and more quickly than a great quantity. For it moves either when it is collected or dissipated by heat. Since, then, inhaling is the drawing in of the cold, the air which is in us would be absorbed in it;

900 a δὲ ἐκπνοή, θερμοῦ κινήσαντος ἀέρα, γίνοιτ' ἂν [ἢ]
 900 b φωνή· ἐκπνέοντες γάρ, οὐκ εἰσπνέοντες φωνοῦμεν.
 ἐπεὶ δὲ τὰ νέα θερμότερά ἐστι τῶν πρεσβυτέρων
 καὶ τοὺς ἐν αὐτοῖς πόρους στενωτέρους ἔχει,
 ἐλάττω ἂν ἀέρα ἔχοι ἐν ἑαυτοῖς. ὄντος δὲ τοῦ τε
 κινουμένου ἐλάττονος καὶ τοῦ κινουμένου θερμοῦ
 5 πλείονος ἐν αὐτοῖς, θάπτον ἂν δι' ἄμφω ἢ κίνησις
 γένοιτο τοῦ ἀέρος· ἢ δὲ θάπτων ὀξυφωνοτέρα ἂν
 εἶη διὰ τὰ προειρημένα.

Διὰ τί οἱ κλαίοντες ὀξὺ φθέγγονται, οἱ δὲ 15
 γελῶντες βαρὺ; ἢ ὅτι οἱ μὲν κλαίοντες συν-
 τείνοντες καὶ συνάγοντες τὸ στόμα φωνοῦσιν; τῇ
 10 τε δὴ συντονία κινεῖται ταχὺ ὁ ἐν αὐτοῖς ἀήρ,
 καὶ τῷ διὰ στενοῦ τοῦ στόματος φέρεσθαι θάπτον
 φέρεται· δι' ἄμφω οὖν ὀξειᾶ γίνεται ἢ φωνή. οἱ δὲ
 γελῶντες ἀνέντες τὸν τόνον γελῶσι καὶ κεχηνότες.
 ἐκπέμποντες οὖν διὰ τοῦτ' εὐρέως καὶ βραδέως
 τὸν ἀέρα εἰκότως βαρυφωνοῦσιν.

15 Διὰ τί οἱ ἄγονοι, οἷον παῖδες, γυναῖκες, καὶ οἱ 16
 ἤδη γέροντες καὶ οἱ εὐνοῦχοι, ὀξὺ φθέγγονται, οἱ
 δὲ ἄνδρες βαρὺ; ἢ καθάπερ ἢ γραμμὴ καὶ τὰ
 ἄλλα λεπτὰ ἐν διάστημα ἔχει, τὰ δὲ παχέα πλείω,
 οὕτω καὶ ἢ λεπτὴ φωνὴ ἐν ἂν ἔχοι διάστημα;
 20 ῥᾶον δὲ καὶ ποιῆσαι καὶ κινήσαι ἐστὶν ἐν ἢ πλείω.
 ἐχόντων οὖν τῶν προειρημένων πνεῦμα ἀσθενές,
 κινεῖ αὐτῷ ἀέρα ὀλίγον. ἐλάχιστος δὲ ἐστὶν ὁ
 ἐν διάστημα ἔχων, ὅς ἐσται λεπτός διὰ τὰ προειρη-
 μένα. καὶ ἢ ἀπ' αὐτοῦ φωνὴ γινομένη τοιαύτη·
 ἢ δὲ λεπτὴ φωνὴ ὀξειᾶ ἐστὶν. οἱ μὲν οὖν ἄγονοι

but exhalation, when heat sets the air in motion, would become voice ; for we speak when exhaling, not when inhaling. Since, then, the young are warmer than the old, and have narrower channels in them, they would have less air in them. Since, then, that which is moved is less, and the heat which causes the movement in them is greater, the movement of the air would be faster for both these reasons ; and the quicker moving air is shriller for the reasons given above.

Why do those who weep speak with a shrill voice, 15 but those who laugh with a deep one ? Is it because those who weep strain and contract the mouth when they speak ? Owing to the strain the air in them moves quickly, and travels more rapidly because it passes through a narrower mouth ; for both these reasons the voice becomes shrill. But those who laugh do so by relaxing the strain and opening their mouths. As, therefore, they drive the air through a wide opening slowly they naturally speak with a deep voice.

Why do the unproductive, such as boys, women and 16 those who are quite old and eunuchs, speak with a shrill voice, but men with a deep voice ? Is it that, just as a line and other unsubstantial things have only one dimension but solid bodies have more, so a thin voice has only one dimension ? Now it is easier both to create and to move one thing than several. As, then, with the persons enumerated above the breath is weak, it only moves a little air. But that which has only one dimension is very small in quantity, since it will be thin for the reason given above. The voice which comes from it must necessarily be of the same kind ; but a thin voice is shrill. This is why the unpro-

900 b δια ταῦτα ὀξύφωνοί εἰσιν· οἱ δὲ ἄνδρες ἰσχύοντες
 25 τῷ πνεύματι πολὺν ἀέρα κινουῦσι, πολὺς δὲ ὢν
 βραδέως ἂν κινοῖτο καὶ βαρεῖαν φωνὴν ποιεῖ.
 ἐποίει γὰρ ἢ τε λεπτὴ καὶ ἢ ταχεῖα κίνησις ὀξεῖαν
 φωνήν, ὢν οὐδέτερον ἐπὶ τοῦ ἀνδρὸς συμβαίνει
 γίνεσθαι.

Διὰ τί αἱ φωναὶ βαρύτεραι ἡμῖν εἰσὶ τοῦ χειμῶνος; 17
 30 ἢ ὅτι παχύτερος ὁ ἀήρ ἐστὶ τότε, καὶ ὁ ἐν ἡμῖν καὶ
 ὁ ἐκτός; παχύτερου δὲ ὄντος βραδυτέρα ἢ κίνησις
 γίνεται, ὥστε ἢ φωνὴ βαρυτέρα. ἔτι ὑπνωτικώ-
 τεροί ἐσμεν τοῦ χειμῶνος ἢ τοῦ θέρους, καὶ καθ-
 εύδομεν πλείω χρόνον· ἐκ δὲ τῶν ὑπνων βαρύτεροί
 ἐσμεν. ἐν ᾧ οὖν πλείονα χρόνον καθεύδομεν ἢ
 35 ἐγρηγόραμεν (οὗτος δὲ ἐστὶν ὁ χειμῶν), ἐν τούτῳ
 ἂν εἴημεν βαρυφωνότεροι ἢ ἐν ᾧ τοῦναντίον. τοῦ
 γὰρ μεταξὺ τῆς ἐγέρσεως ὄντος ὀλίγου χρόνου, ἢ
 ἐν τῷ ὑπνῷ ἕξις γινομένη διαμένει πρὸς τὴν καθ-
 ὑπνωσιν.

Διὰ τί ἐκ τῶν πότων καὶ τῶν ἐμέτων καὶ ἐν τοῖς 18
 901 a ψύχεσι βαρύτερον φθέγγονται; ἢ διὰ τὴν ἔμφραξιν
 τοῦ φάρυγγος τὴν γινομένην ὑπὸ τοῦ φλέγματος;
 ἐπικατασπᾶ γὰρ ρευμάτιον εἰς αὐτόν· καὶ τοῖς μὲν
 ὁ ἔμετος ἢ ὁ πότος, τοῖς δὲ ἢ ὥρα καὶ τὸ συμ-
 5 πλήρωμα στενώτερον ποιεῖ τὸν φάρυγγα, ὥστε
 βραδυτέρα γίνεται ἢ φορὰ τοῦ πνεύματος. ἢ δὲ
 βραδεῖα φορὰ καὶ βαρεῖαν ποιεῖ φωνήν.

Διὰ τί ἐγγύθεν μὲν ἢ βαρυτέρα μάλλον ἐξ- 19
 ἀκούεται, πόρρωθεν δὲ ἤττον; ἢ διότι ἢ βαρυτέρα
 φωνὴ πλείω μὲν ἀέρα κινεῖ, οὐκ εἰς μῆκος δέ;
 10 πόρρωθεν μὲν οὖν ἤττον ἀκούομεν, διότι ἐπ' ἔλαττον
 κινεῖται, ἐγγύθεν δὲ μάλλον, διότι πλείων ἡμῖν
 ἀήρ πρὸς τὸ αἰσθητήριον προσπίπτει. ἢ δὲ ὀξεῖα

ductive have shrill voices ; but men, being strong in breathing power, move much air, and being in great quantity it must move more slowly and produce a deep voice. For a thin and swift movement produces a shrill voice, neither of which qualities exist in the case of a man.

Why are voices deeper in winter ? Is it because ¹⁷ the air is thicker at that time, both that within us and that without ? As it is thicker, its movement is slower, so that the voice is lower. Moreover, we are more inclined to sleep in the winter than in the summer and for a longer time ; and after sleep we are heavier. At the time, then, when we sleep for a longer time than we are awake (that is in the winter), at that time we should have a deeper voice than when the conditions are the opposite. For in the short time between, when we are awake, the condition established in sleep persists and inclines to sleepiness.

Why do men speak in a lower key after drinking, ¹⁸ vomiting and in cold weather ? Is it because of the obstruction of the pharynx due to phlegm ? For it causes fluid matter to collect in it ; for in the first case the vomiting or drinking and in the other the season of the year and consequent filling make the pharynx narrower, so that the passage of breath is slower. And the slow passage causes a deep voice.

Why is a deep voice more audible from near by, but ¹⁹ less audible from a distance ? Is it because the deeper voice moves more air, but not over a great space ? So we hear it less well at a distance, because it moves over a smaller space, but we hear it better from near by, because more air strikes our sense organ. But

101 a

πόρρω ἀκούεται, ὅτι λεπτοτέρα ἐστί, τὸ δὲ λεπτὸν
 τὴν εἰς μῆκος αὐξήσιν ἔχει. λέγοι δ' ἂν τις ὅτι
 καὶ θάπτων ἐστὶν ἢ ποιούσα αὐτὴν κίνησις. εἴη
 15 δ' ἂν τοῦτο, εἰ πυκνὸν μὲν στενὸν δ' εἴη τὸ κινουῦν
 πνεῦμα τὸν ἀέρα. ὅ τε γὰρ ὀλίγος εὐκίνητότερός
 ἐστὶν ἀήρ (κινεῖται γὰρ ὀλίγος ὑπὸ τοῦ στενοῦ),
 καὶ τὸ πυκνὸν πλείους πληγὰς ποιεῖ, αἱ τὸν ψόφον
 ποιούσιν. ἰδεῖν δ' ἔστι τοῦτο ἐπὶ τῶν ὀργάνων.
 αἱ γὰρ λεπτότεραι χορδαὶ ὀξύτεραί εἰσι, τῶν ἄλλων
 τῶν αὐτῶν ὑπαρχόντων αὐταῖς.

20 Διὰ τί ἢ φωνὴ ὀξύτερα φαίνεται τοῖς μακροτέραν 20
 ἀφεστηκόσι, τοῦ ὀξέος ὄντος ἐν τῷ ταχέως
 φέρεσθαι; τὸ δὲ μακρότερον φερόμενον βραδύτερον
 κινεῖται. ἢ ὅτι ἢ ὀξύτης τῆς φωνῆς οὐ μόνον ἐστὶν
 ἐν τῷ ταχέως κινεῖσθαι, ἀλλὰ καὶ ἐν τῷ λεπτότατον
 25 ψόφον γίνεσθαι. τοῖς δὲ μακροτέραν ἀφεστηκόσιν
 αἰεὶ λεπτοτέρα ἢ φωνὴ ἀφικνεῖται διὰ τὴν ὀλιγότητα
 τοῦ ἀέρος τοῦ κινουμένου; μαραίνεται γὰρ ἢ
 κίνησις, μαραινόμενος δὲ ὁ ἀριθμὸς μὲν εἰς τὸ ἐν
 τελευτᾷ, σῶμα δὲ εἰς διάστημα ἓν, ὃ ἐστὶν ἐν
 σώματι λεπτότης. ὁμοίως δὲ καὶ ἐν φωνῇ.

30 Διὰ τί καὶ οἱ γεγυμνασμένοι καὶ οἱ ἀσθενεῖς ὀξύ 21
 φθέγγονται; ἢ ὅτι οἱ μὲν ἀσθενεῖς ὀλίγον ἀέρα
 κινουῦσιν, ὃ δὲ ὀλίγος τοῦ πλείονος θᾶπτον φέρεται.
 οἱ δὲ γεγυμνασμένοι ἰσχυρῶς κινουῦσι τὸν ἀέρα, ὃ
 δὲ ἰσχυρῶς κινούμενος ἀήρ θᾶπτον φέρεται. τὸ
 δὲ ταχὺ ἐν φορᾷ ἐν φωνῇ ὀξύ ἐστὶν.

35 Διὰ τί τοῖς μετὰ τὰ σιτία κεκραγόσιν ἢ φωνὴ 22
 101 b διαφθείρεται; καὶ πάντα ἂν ἴδοιμεν τοὺς φωνα-
 σκουῦντας, οἷον ὑποκριτὰς καὶ χορευτὰς καὶ τοὺς
 ἄλλους τοὺς τοιούτους, ἔωθέν τε καὶ νήστευς ὄντας
 τὰς μελέτας ποιουμένους. ἢ τὸ διαφθείρεσθαι τὴν

the shrill voice is heard at a distance because it is thinner, and what is thin extends to a distance. One might say that the movement producing it is quicker. And this would be the case if the breath which moves the air were both dense and narrow. For the small quantity of air is more easily moved (for only a little is moved by that which is narrow), and that which is dense causes more blows, which are the cause of sound. This can be seen in instruments; for the thinner strings are shriller, if other conditions are the same.

Why does the voice sound shriller to those who are 20 farther away, seeing that shrillness depends upon the rapidity of motion? But that which travels farther moves more slowly. Is it because shrillness of voice depends not only upon rapidity of motion, but also on the sound itself being very thin; but to those who are standing farther off the voice always comes in a thinner state because of the smallness of the air moved? For the movement fades, and just as a diminishing number terminates in one, so a diminishing body ultimately reaches one dimension, which in the case of a body implies thinness. The same thing is true with the voice.

Why do those who have taken exercise and weak 21 persons speak in a shrill voice? Is it because the weak move but little air, and a little air travels more quickly than a larger quantity. But those who have taken exercise cause a violent movement in the air, and violently moved air travels more quickly. And rapid movement in voice implies shrillness.

Why does it spoil the voice to shout after food? 22 We can see that all who practise voice production, such as actors, chorus-singers and the like, perform their exercises in the morning and fasting. Is the ruin

01 b
 5 φωνήν οὐθὲν ἕτερόν ἐστιν ἢ τὸν τόπον διαφθείρε-
 σθαι καθ' ὃν τὸ πνεῦμα διεξέρχεται; διὸ καὶ οἱ
 βραγχιῶντες διαφθείρονται τὰς φωνάς, οὐ τῷ τὸ
 πνεῦμα γίνεσθαι χεῖρον, ὃ ποιεῖ τὴν φωνήν, ἀλλὰ
 τῷ τετραχύνθαι τὴν ἀρτηρίαν. ὑπὸ δὲ τῆς θερ-
 10 μασίας τῆς σφοδρᾶς μάλιστα τραχύνεσθαι πέφυκεν
 ὁ τόπος οὗτος. διὸ καὶ οὕθ' οἱ πυρέττοντες οὔτε
 οἱ σφόδρα πεπυρεχότες εὐθὺς μετὰ τὴν ἀνεσιν τοῦ
 πυρετοῦ ἄδειν δύνανται· τετράχυνται γὰρ ὁ φάρυξ
 αὐτοῖς διὰ τὴν θερμασίαν. ἀπὸ δὲ τῶν σιτίων
 εἰκὸς εἶναι τὸ πνεῦμα καὶ πολὺ καὶ θερμόν· τὸ δὲ
 15 τοιοῦτον εὐλογόν ἐστι διεξιὸν ἐλκοῦν τε καὶ
 τραχύνειν τὴν ἀρτηρίαν· τούτου δὲ συμβαίνοντος
 εἰκότως ἢ φωνὴ διαφθείρεται.

Διὰ τί, εἴπερ ἢ φωνὴ ἐστιν ἀήρ τις ἐσχηματι- 23
 σμένος καὶ φερόμενος, διαλύεται πολλάκις τὸ σχῆμα,
 ἢ δὲ ἠχώ, ἢ γίνεται πληγέντος τοῦ τοιούτου πρὸς
 τι στερεόν, οὐ διαλύεται αὕτη, ἀλλὰ σαφῶς ἀκούο-
 20 μεν αὐτῆς; ἢ ὅτι ἀνάκλασις ἐστιν, ἀλλ' οὐ κατά-
 κλασις; οὕτω δὲ τό θ' ὅλον διαμένει, καὶ δύο
 μέρη ὁμοιοσχήμονα ἐξ αὐτοῦ γίνεται· πρὸς ὁμοίαν
 γὰρ γωνίαν ἐστὶν ἢ ἀνάκλασις. διὸ καὶ ὁμοία
 γίνεται ἢ τῆς ἠχοῦς φωνὴ τῇ ἐξ ἀρχῆς.

Διὰ τί τῶν μὲν ἄλλων ζώων τὰ νεὰ καὶ νήπια 24
 25 ὀξύτερον φθέγγονται τῶν τελείων, οἱ δὲ μόσχοι
 βαρύτερον τῶν τελείων βοῶν; ἢ ὅτι ἐν ἐκάστῳ
 γένει τὸ νήπιον ὁμοίον ἐστὶ τῷ ἐν αὐτῷ θήλει;
 τῶν βοῶν δὲ αἱ θήλειαι βαρύτερον φθέγγονται τῶν
 ἀρρένων, οἱ δὲ μόσχοι ταύταις ὁμοιότεροί εἰσιν ἢ
 τοῖς ἀρρεσιν· τὰ δὲ ἄλλα τούναντίον.

30 Διὰ τί, ὅταν ἀχυρωθῶσιν αἱ ὀρχῆστραι, ἤττον 25

of the voice nothing but spoiling that region through which the breath passes out? So those who suffer from sore throat have spoiled voices, not because the breath which produces the voice is in any way inferior, but because the vocal chords are roughened. This region is by nature most easily roughened by excessive heat. Consequently neither those who are feverish nor those who have just recovered from violent fever can sing after the abatement of the fever; for their pharynx has been roughened by the heat. But after food it is natural that the breath should be considerable and hot; and it is reasonable to suppose that such breath, as it passes out, should make the wind-pipe sore and rough; so when this occurs the voice is naturally spoiled.

Why is it that, since the voice is air which has taken ²³ shape and is travelling, the shape is so often dissolved, but echo, which occurs when air in this condition strikes something hard, is not dissolved, but we hear it clearly? Is it because it is refracted and not scattered? Consequently the whole persists, and two similar shapes arise from it ^a; for refraction occurs at a similar angle. Hence the sound of the echo is similar to the original sound.

Why is it that the young of all other animals and ²⁴ infants have shriller voices than the developed creature, but that calves sound a lower note than oxen? Is it because in each genus the infant is similar to the female element in it? Among cattle the female sounds a lower note than the male, and calves resemble the female more than the male. But in other animals the reverse is true.

Why are choruses less distinct when the orchestra ²⁵

^a *i.e.* the voice and the echo.

901 b

οἱ χοροὶ γεγώνασιν; ἢ διὰ τὴν τραχύτητα προσ-
πίπτουσα ἢ φωνὴ οὐ πρὸς λείον τὸ [δὲ] ἔδαφος
ἦττον γίνεται μία, ὥστ' ἐλάττων; οὐ γὰρ συνεχῆς.
ὥσπερ καὶ τὸ φῶς ἐπὶ τῶν λείων μᾶλλον (φαίνει)
35 διὰ τὸ <μῆ> διαλαμβάνεσθαι τοῖς ἐμποδίζουσιν.

902 a Διὰ τί ποτε ὁ ἄλς, ὅταν εἰς πῦρ ἐμβληθῆ, ψοφεῖ; 26

ἢ ὅτι ὁ ἄλς ὑγρὸν ἔχει οὐ πολὺ, ὃ ὑπὸ τοῦ θερμοῦ
ἐκπνευματούμενον καὶ βία ἐκπίπτον σχίζει τὸν ἄλα;
τὸ δὲ σχιζόμενον ἅπαν ψοφεῖ.

5 Διὰ τί ποτε τῶν παιδίων ἔνια, πρὶν ἤκειν τὴν 27

ἡλικίαν ἐν ἧ σαφηνίζειν ὥρα αὐτοῖς, φθεγξάμενα
καὶ σαφῶς εἰπόντα πάλιν ὁμοίως διάγουσιν, ἕως
ἂν ἔλθῃ ὁ εἰωθὸς χρόνος; ἃ δὴ πολλοὶ τέρατα
νομίζουσιν εἶναι. ἤδη δ' ἔνια λέγεται καὶ εὐθὺς

10 γινόμενα φθέγξασθαι. ἢ ὅτι ὡς μὲν ἐπὶ πολὺ τὰ
πλείω τε τῶν γενομένων γίνεται κατὰ φύσιν, διὸ
ὀλίγοις τοῦτο συμβαίνει, καὶ φύσει ἅμα κατάλληλα
τελειοῦται· διὸ καὶ ἀκούει τε ἅμα καὶ φωνεῖ καὶ
ξυνίησι κατὰ τὴν ἀκοὴν καὶ λέγει καὶ σαφηνίζει.
οὐ μὲν ἀλλὰ πολλάκις οὐκ ἀπαρτίζει τὰ αὐτά,

15 ἀλλὰ τὰ μὲν ξυνίησι πρότερον ἢ τοῦτο τὸ μόριον
ἀπολυθῆναι ὧ διαλέγεται, τοῖς δὲ τούναντίον.
ταῦτα μὲν οὖν οὐκ ἂν διαλεχθείη συνετῶς (ἃ γὰρ
ἂν ἀκούσωσι, διαλέγονται)· ἀλλ' ὅταν ἤκη καιρὸς
ἀμφοῖν, ἀποδιδόασιν τὸ κατὰ φύσιν. ὅσοις δὲ ἐμ-
προσθεν ἢ κατὰ τὴν ἀκοὴν αἴσθησις διακριβοῦται
20 ἐν τῇ ψυχῇ, ἢ¹ ὧ πρώτῳ κινουῦσι τὴν φωνὴν καὶ
ποιοῦσι λόγον, τούτοις ἐνίοτε γίνεται ἤδη ξυνιείσι
πολλὰ καὶ δύνამίς τις τοῦ μορίου καὶ ἀπόλυσις,

¹ ἢ Bussemaker: om. Ruelle.

PROBLEMS, XI. 25-27

is covered with straw? Is it due to the roughness that the voice falling on a surface which is not smooth is less united, so that it is less? For it is not continuous. Just in the same way light shines more on a smooth surface because it is not interrupted by any obstruction.

Why does salt crackle when it is thrown in the 26 fire? Is it because salt contains a little moisture, which when evaporated by the heat bursts violently forth and splits the salt? For what is split always makes a noise.

Why do some children, before they reach the age 27 at which it is natural for them to speak clearly, utter some words and speak quite clearly, and then resume their normal state until the usual time for speaking arrives? Many regard this as abnormal. But some are reported to have spoken immediately after birth. Is it because most children who are born act according to nature (this is why it only happens to a few), and their faculties develop in natural uniformity; so they hear and speak and understand what they hear, and say words and articulate clearly all at the same time. Sometimes, however, the same things do not develop together; some children understand before the faculty by which they converse is released, and in other cases the reverse is true. Then their conversation would not be intelligent (for they only repeat what they hear); but when the due season for both has arrived, they function naturally. But those in whom the sense of hearing develops accurately in the soul before the faculty whereby they first set in motion the voice and produce words, in their case the capacity and release of this part comes when they already understand many things. This occurs

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 μάλιστα μὲν μετὰ ὕπνον τινά (τούτου δ' αἴτιον ὅτι
 ὁ ὕπνος καὶ τὰ σώματα νωθέστερα ποιεῖ καὶ τὰ
 μόρια ἀναπαύσας), εἰ δὲ μή, καὶ ἄλλην μεταβολὴν
 25 λαβόντα τοιαύτην. πολλὰ δὲ ἔχομεν τοιαῦτα
 ποιεῖν, ἃ μικρῶν δεῖται καιρῶν· κάπειτα οὐκέτι
 ὁμοίως ἔχει, ὅταν οὕτω τύχη τὸ μόριον ἔχον καὶ
 ἀπολυθέν· ὅταν ἐπιπολῆς ἢ ἐν τῇ αἰσθήσει ὦν
 ἐκινήθη διάνοια, κατὰ τὴν ἀκοὴν τοῦτο ἐπανῆλθε
 30 καὶ ἐφθέγγετο. πολλάκις δὲ καὶ μέλη καὶ ῥήματα
 ἐπέρχεται οὐκ ἐκ προαιρέσεως ἡμῖν· ἀλλ' ἐὰν τὸ
 πρῶτον προελόμενοι εἴπωμεν, ὕστερον ἄνευ προ-
 αιρέσεως λέγομεν ἢ ἄδομεν, καὶ οὐ δύναται ἐκ τοῦ
 στόματος ἐξελθεῖν. οὕτω καὶ τοῖς παιδίοις, ὅταν
 συμβῆ τοῦτο ἐπόν, εἶτα πάλιν καταστῆ εἰς τὴν
 35 φύσιν ἐκεῖνο τὸ μόριον, ἕως ἂν ἡ ὥρα ἔλθῃ ἰσχυῖσαι
 αὐτὸ καὶ ἀποκριθῆναι.

Διὰ τί ἔνια ψοφεῖ καὶ κινεῖται ἐξαίφνης, οἷον 28
 τὰ κιβώτια, οὐδενὸς αἰσθητοῦ κινουῦντος; καίτοι
 κρεῖττον γέγονε τὸ κινουῦν τοῦ κινουμένου. ὁ δὲ
 αὐτὸς λόγος καὶ φθορᾶς καὶ γήρωσ· ὑπὸ ἀναισθήτου
 902 b γὰρ φθείρεται τὰ λεγόμενα ὑπὸ τοῦ χρόνου πάντα.
 ἢ ὅμοιον τοῦτο τοῖς σταλαγμοῖς καὶ τοῖς ὑπὸ τῶν
 ἐκφυομένων αἰρομένοις λίθοις; οὐ γὰρ τὸ τελευ-
 ταῖον αἶρει ἢ κινεῖ, ἀλλὰ τὸ συνεχές. ἐπὶ δὲ
 τούτου συνέβη ἀναισθήτου ὄντος αἰσθητὴν γίνε-
 5 σθαι τὴν κίνησιν. οὕτω δὲ καὶ τὸ περιεχόμενον
 αἰσθητοῖς χρόνοις κινεῖται καὶ διαιρεῖται εἰς ἀν-
 αίσθητα, τῷ δὲ παντὶ καὶ συνεχεῖ ἐκίνησε καὶ
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PROBLEMS, XI. 27-28

particularly after sleep (the reason for this is that sleep makes bodies and its parts more sluggish by giving them a rest), and if not after sleep, then after undergoing some other such change. We can do many things of this kind, which only need slight occasions ; and then the conditions are no longer the same, when the part happens to be in this state of release ; and when things, a thought of which has been aroused, are present on the surface in the sense, the child returns to it on hearing and gives utterance to it. But tunes and words often occur to us involuntarily. But if once we have spoken them with deliberate intent, we afterwards say or sing them involuntarily, and cannot rid our lips of them. So too with children, when this occurs, and the part then returns to its normal condition, until the time arrives for it to grow strong and to become separated.

Why do some things, such as wooden boxes, make 28 a sound and move suddenly, without anything perceptible to move them ? And yet that which causes the movement must be greater than that which is moved. The same reasoning applies to decay and old age ; for all the things which are said to be destroyed by time are destroyed by something which is imperceptible. Is it similar to the dripping of water and to stones which are lifted by plants ? It is not the last action that raises or moves them, but its continuity. But the movement becomes perceptible as the result of this action which is imperceptible. So, too, all that which is included in perceptible time is moved and divided into imperceptible parts, but the movement or the decay is caused by the whole

ἔφθειρεν. συνεχές δέ ἐστιν οὐκ ἐν τῷ νῦν, ἀλλ' ἐν τῷ ὠρισμένῳ χρόνῳ ὑπὸ τοῦ νῦν.

Διὰ τί οἱ χασμώμενοι ἤττον ἀκούουσιν; ἢ ὅτι 29
 10 τοῦ ἐξιόντος πνεύματος ἐν τῇ χάσμῃ πολὺ καὶ εἰς τὰ ὦτα χωρεῖ ἔσωθεν, ὥστε καὶ τῇ αἰσθήσει ἐπίδηλον εἶναι τὴν κίνησιν ἣν ποιεῖ περὶ τὴν ἀκοήν, μάλιστα δ' ἐκ τῶν ὕπνων; ὁ δὲ ψόφος ἀήρ ἢ πάθος ἀέρος ἐστίν. ἀντιπαίοντος οὖν τοῦ ἔσωθεν εἰσέρχεται ὁ ἔξωθεν ψόφος, καὶ ὑπὸ τῆς κινήσεως
 15 καὶ τοῦ ἔξωθεν ψόφου ἐκκρούεται ἡ κίνησις.

Διὰ τί ἰσχυρόφωνοι παῖδες ὄντες μᾶλλον ἢ ἄνδρες; 30
 ἢ ὥσπερ καὶ τῶν χειρῶν καὶ τῶν ποδῶν αἰεὶ ἤττον κρατοῦσι παῖδες ὄντες, καὶ ὅσοι ἐλάττους οὐ δύνανται βαδίζειν, ὁμοίως καὶ τῆς γλώττης οἱ
 20 νεώτεροι οὐ δύνανται; εἰ δὲ παντάπασι μικροὶ ὦσιν, οὐδὲ φθέγγεσθαι δύνανται ἀλλ' ἢ ὥσπερ τὰ θηρία, διὰ τὸ μὴ κρατεῖν. εἴη δ' ἂν οὐ μόνον ἐπὶ τοῦ ἰσχυροφώνου, ἀλλὰ καὶ τραυλοὶ καὶ ψελλοί. ἢ μὲν οὖν τραυλότης τῷ γράμματός τινος μὴ κρατεῖν, καὶ τοῦτο οὐ τὸ τυχόν, ἢ δὲ ψελλότης τῷ ἐξαίρειν
 25 τι, ἢ γράμμα ἢ συλλαβὴν, ἢ δὲ ἰσχυροφωνία ἀπὸ τοῦ μὴ δύνασθαι ταχὺ συνάψαι τὴν ἑτέραν συλλαβὴν πρὸς τὴν ἑτέραν. ἅπαντα δὲ δι' ἀδυναμίαν τῇ γὰρ διανοίᾳ οὐχ ὑπηρετεῖ ἡ γλῶττα. ταῦτο δὲ τοῦτο καὶ οἱ μεθύοντες πάσχουσι καὶ οἱ πρεσβῦται· ἤττον δὲ πάντα συμβαίνει.

30 Διὰ τί ἡ φωνὴ τρέμει καὶ τῶν ἀγωνιώντων καὶ 31
 τῶν δεδιότων; ἢ ὅτι σείεται ἡ καρδία τοῦ θερμοῦ ἐξιόντος; ἀμφοτεράκις δὲ πάσχουσι τοῦτο· καὶ γὰρ τοῖς ἀγωνιῶσι συμβαίνει καὶ τοῖς φοβουμένοις.

PROBLEMS, XI. 28-31

and continuous time. But what is continuous does not belong to the present moment, but to a time which is limited by the present moment.

Why can men hear less when they are yawning? 29
Is it because as the breath is passing out in a yawn, much is entering the ears from the inside so that the movement which it causes in the region of the ears is evident to the senses, and especially after sleep? But sound is air or a condition of air. The air from the outside, therefore, enters at the time when the air from the inside strikes against it, and the movement is thus checked by the movement of the sound entering from the outside.

Why are boys more inclined to stammer than men? 30
Just as boys have always less control over their hands and feet, and those who are smaller still cannot even walk, so also are those who are young unable to control their tongue? If they are very small, they cannot even speak except in the way beasts do, because of their lack of control. This is not only true of the stammerer, but lisping and defective speakers are similar. Lisping is an inability to control a certain letter, not any letter, but defective speech consists of omitting some letter or syllable, while stammering is an inability to add quickly one syllable to another. But all these disabilities are due to a failure of power; for the tongue does not serve the intention. The drunken and old men suffer the same difficulty, but all these difficulties happen less to them (*i.e.* than to children).

Why does the tongue tremble when men are 31
anxious or afraid? Is it because the heart palpitates owing to the giving out of heat? For men suffer this trouble in both these cases; for it is found both when men are anxious and when they are afraid. When

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σειομένης δὲ οὐ γίνεται μία ἢ πληγή, ἀλλὰ πλείους,
35 ὥσπερ ἢ τῶν παρανενευρισμένων χορδῶν.

Διὰ τί οἱ μὲν ἀγωνιῶντες βαρὺ φθέγγονται, οἱ 32
δὲ φοβούμενοι ὀξύ; ἢ ὅτι τοῖς μὲν φοβουμένοις
καταψύχεται ὁ τόπος ὁ περὶ τὴν καρδίαν, κάτω
ὀρμῶντος τοῦ θερμοῦ, ὥστε ὀλίγον ἀέρα κινουῖσιν;
903 a ἢ γὰρ ἰσχύς ἐν τῷ θερμῷ· τοῖς δὲ ἄνω φέρεται
τὸ θερμόν, ὥσπερ τοῖς αἰσχυνομένοις· δι' αἰσχύνην
γὰρ καὶ ἀγωνιῶσιν. τοῖς δὲ αἰσχυνομένοις ἄνω
φέρεται πρὸς τὸ πρόσωπον· σημεῖον δὲ ὅτι ἐξέρυθροι
γίνονται μᾶλλον. συντήκει οὖν καὶ παχὺν ποιεῖ
5 τὸν ἀέρα ὧ φθέγγονται· ὁ δὲ τοιοῦτος βραδέως
ὠθεῖται· τὸ δὲ βραδὺ ἐν φωνῇ βαρὺ ἐστίν.

Διὰ τί εὐηκοωτέρα ἢ νύξ τῆς ἡμέρας ἐστίν; 33
πότερον, ὥσπερ Ἀναξαγόρας φησί, διὰ τὸ τῆς μὲν
ἡμέρας σίζειν καὶ ψοφεῖν τὸν ἀέρα θερμαινόμενον
10 ὑπὸ τοῦ ἡλίου, τῆς δὲ νυκτὸς ἡσυχίαν ἔχειν ἅτε
ἐκλελοιπότης τοῦ θερμοῦ, εἶναι δὲ μᾶλλον ἀκουστόν
μηθενὸς ὄντος ψόφου; ἢ ὅτι διὰ τοῦ κενωτέρου
μᾶλλον ἀκουστόν ἐστίν ἢ διὰ τοῦ πλήρους; ἐστὶ
δὲ τῆς μὲν ἡμέρας ὁ ἀῆρ πυκνὸς ἅτε πεπληρωμένος
ὑπὸ τοῦ φωτὸς καὶ τῶν ἀκτίνων, τῆς δὲ νυκτὸς
15 ἀραιότερος διὰ τὸ ἀπεληλυθέναι ἐξ αὐτοῦ τὸ πῦρ
καὶ τὰς ἀκτῖνας, σώματα ὄντα. ἢ ὅτι τῆς μὲν
ἡμέρας τὰ σώματα πρὸς πολλὰ τὴν διάνοιαν ἔλκει·
διὸ οὐκ εὐκρινές ἐστι πρὸς τὴν ἀκοήν. καὶ τῷ
πράττειν ἡμᾶς πάντα μᾶλλον ἐν τῇ ἡμέρᾳ ἢ τῇ
νυκτί, καὶ αὐτῇ¹ περὶ τὰς πράξεις ἐστίν. χωρι-
20 σθεῖσα δὲ αἴσθησις διανοίας καθάπερ ἀναίσθητον
πόνον ἔχει, ὥσπερ εἴρηται τὸ “ νοῦς ὄρα καὶ νοῦς

¹ αὐτῇ Richards: αὐτὰ Ruelle.

^a Epicharmus, Fr. 2.

PROBLEMS, XI. 31-33

the heart palpitates it is not from one blow but from many, like that from badly stretched strings.

Why do men who are anxious speak in a low voice, 32 but those who are afraid in a shrill one? Is it because the region of the heart grows cold when men are afraid, because the heat rushes downwards, so that they move but little air? For the motive power lies in heat; but in those who are anxious heat rushes upwards, as it does with those who are ashamed; for men grow nervous through shame. When they are ashamed the heat travels up as far as the face; this is proved by the fact that they grow more red. This dissolves and thickens the air by which they speak; and air of this kind is pushed out slowly; but slowness in the voice implies deep voice.

Why is it easier to hear at night than in the day- 33 time? Is it, as Anaxagoras says, because in the day-time the air being heated by the sun hisses and sounds, but in the night all is quiet because the heat has left the air, and it is more easy to hear when there is no noise? Or is it because it is more easy to hear through a void than through a space that is filled? During the day the air is dense, because it is full of light and the rays of the sun, but at night it is rarer because the light and the rays of the sun, which are corporeal, have departed from it. Or is it because in the day-time bodies attract our attention to many things; and so we are not discriminating in the matter of hearing? Also because we are engaged in all forms of activity more in the day than in the night, our attention is concentrated on actions. But perception apart from intelligence does as it were an imperceptible amount of work, as the saying goes "It is mind that sees and mind that hears."^a But

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ἀκούει.” νυκτὸς δὲ τῆς ὄψεως ἀργούσης καὶ τῆς
 διανοίας μᾶλλον ἡρεμούσης ὁ τῆς ἀκοῆς πόρος
 μᾶλλον ἀνεωγμένος,¹ δεκτικὸς μὲν ἐστὶ τῶν ἤχων
 ὁμοίως, ἐξαγγελτικὸς δὲ μᾶλλον [ἢ] τῆ διανοία διὰ
 25 τὸ μήτε αὐτὴν ἐνεργεῖν, μήθ’ ὑπὸ τῆς ὄψεως
 παρενοχλεῖσθαι, καθάπερ καὶ τῆς ἡμέρας.

Διὰ τί οἱ ἄγονοι, οἷον παῖδες καὶ γυναῖκες καὶ
 οἱ ἤδη γέροντες καὶ οἱ εὐνοῦχοι, ὄξυ φθέγγονται,
 οἱ δὲ ἄνδρες βαρύτερον; ἢ δι’ ἀσθένειαν τοῦ
 30 κινουῦντος μορίου τὸν ἀέρα; ὀλίγον γὰρ τὸ ἀσθενὲς
 κινεῖ, ὁ δὲ ὀλίγος ταχὺ φέρεται, τὸ δὲ ταχὺ φερό-
 μενον ὄξύ. ἢ διότι ὁ πόρος ὁ πρῶτος, δι’ οὗ
 ἢ φωνὴ φέρεται, τοῖς μὲν ἀγόνοις μικρός, ὥστε
 ὀλίγον ἐξ αὐτοῦ τὸ ὠθοῦν τὸν ἀέρα, ὀλίγος δὲ ὢν
 ταχὺ φέρεται δι’ εὐρέος τοῦ ἄνω φάρυγγος· ἀκμά-
 35 ζουσι δὲ καὶ ἀνδρουμένοις δίσταται οὗτος, ὥσπερ
 καὶ ἐπὶ τοὺς ὄρχεις, ὥστε καὶ πλείων ἐστὶν ὁ
 ὠθούμενος; βραδύτερον οὖν διῶν βαρὺς γίνεται.

Διὰ τί οἱ ἰσχνόφωνοι οὐ δύνανται διαλέγεσθαι
 903 b μικρόν; ἢ ὅτι ἰσχονται τοῦ φωνεῖν, ἐμποδίζοντός
 τινος; οὐκ ἴσης δὲ ἰσχύος οὐδ’ ὁμοίας κινήσεως,
 μὴ ἐμποδίζοντός τε τὴν κίνησιν μηδενὸς καὶ ἐμ-
 ποδίζοντος, βιάσασθαι δεῖ. ἢ δὲ φωνὴ κίνησις ἐστι·
 5 μείζον δὲ φθέγγονται μᾶλλον οἱ τῆ ἰσχυί χρώμενοι.
 ὥστ’ ἐπεὶ ἀνάγκη ἀποβιάζεσθαι τὸ κωλύον,
 ἀνάγκη μείζον φθέγγεσθαι τοὺς ἰσχυροφώνους.

Διὰ τί δὲ ἀγωνιῶντες μὲν μᾶλλον ἰσχνόφωνοι
 γίνονται, ἐν δὲ ταῖς μέθαις ἡττον; ἢ ὅτι ἀπο-
 πληξίας ὁμοίον ἐστὶ τὸ πάθος μέρους τινὸς τῶν
 10 ἐντός, ὃ ἀδυνατοῦσι κινεῖν, ἐμποδίζοντος διὰ τὴν
 κατάψυξιν; ὁ μὲν οὖν οἶνος φύσει θερμὸς ὢν λύει

¹ Ruelle adds καθάπερ τῆς ἡμέρας.

at night when vision is not operative and the intelligence is more at rest, the channel of hearing, being more open, is equally receptive of sounds, and communicates more with the intelligence because it is not itself working and is not confused by vision as it is in the day-time.

34 Why do the unproductive, such as boys, women, and 34 men in old age and eunuchs, speak in a shrill voice, but men in a deeper one? Is it because of the weakness of that part which moves the air? For what is weak moves but little air, but a little air travels fast, and what travels fast is shrill. Or is it because the first channel through which the voice travels is small in the case of the unproductive, and so that which expels the air from it is small, and the air, being small in bulk, travels quickly through the wide upper larynx; but with those in the prime of life and adults this is distended (like the passage to the testicles), so that the air driven through is more? Since then it 35 passes through more slowly it makes a deeper sound.

Why cannot stammerers speak quietly? Is it 35 because they are restrained in uttering words, because something hinders them? When the force required and the movement are not the same, when there is no obstruction and when there is, a violent effort is needed. Now the voice is a movement, and those who use force speak in a louder voice. So that, since the obstruction must be violently overcome, 36 stammerers must speak in a louder voice.

Why do the nervous tend to stammer more, and 36 men under the influence of drink less? Is it because the trouble is a kind of paralysis of one of the parts within, which they cannot move, the restraint being due to chilling? So wine which is naturally hot

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τὴν κατάψυξιν μᾶλλον, ἢ δὲ ἀγωνία ποιεῖ. φόβος γάρ τις ἢ ἀγωνία, ὁ δὲ φόβος κατάψυξις.

Διὰ τί ἔσωθεν εἰς τὰς οἰκίας εἴσω ἀκούεται 37
μᾶλλον ἢ ἔσωθεν ἔξω; ἢ ὅτι ἔσωθεν ὁ ψόφος
15 διὰ τὸ ἀχανὲς ἰέναι διασπᾶται, ὥστε οὐχ ἰκανὸν
ἕκαστον μέρος ἀκουσθῆναι, ἢ ἡττον; ἔσωθεν δὲ
ἔσω εἰς ἐλάττω τόπον καὶ ἀέρα ἐστῶτα ἢ φωνὴ
βαδίζουσα ἀθρόα ἔρχεται, ὥστε μείζων οὔσα
ἀκούεται μᾶλλον.

Διὰ τί οἱ ἰσχνόφωνοι μελαγχολικοί; ἢ ὅτι τὸ 38
20 τῆ φαντασίᾳ ἀκολουθεῖν ταχέως τὸ μελαγχολικὸν
εἶναι ἐστίν, οἱ δὲ ἰσχνόφωνοι τοιοῦτοι· προτερεῖ
γὰρ ἢ ὄρμη τοῦ λέγειν τῆς δυνάμεως αὐτοῖς, ὡς
θᾶπτον ἀκολουθούσης τῆς ψυχῆς τῷ φανέντι. καὶ
οἱ τραυλοὶ δὲ ὡσαύτως· βραδύτερα¹ γὰρ τὰ μόρια
ταῦτα τοῖς τοιούτοις. σημεῖον δέ· οἰνωμένοι γὰρ
25 τοιοῦτοι γίνονται, ὅτε μάλιστα τοῖς φαινομένοις
ἀκολουθοῦσι, καὶ οὐ τῷ νῶ.

Διὰ τί τὰ πράσα συμφέρει πρὸς εὐφωνίαν, ἐπεὶ 39
καὶ τοῖς πέρδιξιν; ἢ ὅτι καὶ τὰ σκόροδα ἐφθὰ
λεαίνει, τὰ δὲ πράσα γλισχρότητα ἔχει τινά;
ρύπτικόν δὲ τοῦ φάρυγγος.

30 Διὰ τί τὰ μὲν ἄλλα ὀξύτερον φθέγγεται σφοδρό- 40
τερα ὄντα, ὁ δὲ ἄνθρωπος ἀσθενῶν; ἢ διότι
ἐλάττω κινεῖ ἀέρα, οὗτος δὲ ταχὺ διέρχεται, τὸ δὲ
ταχὺ ὀξὺν ποιεῖ τὸν ψόφον;

Διὰ τί ἀκούουσι μᾶλλον κατέχοντες τὸ πνεῦμα ἢ 41
85 ἐκπνέοντες; διὸ καὶ ἐν ταῖς θήραις παραγγέλ-
λουσιν ἑαυτοῖς μὴ πνευστιᾶν. πότερον ὅτι τὸ
αἰσθητικὸν ἄνω ἔρχεται αἰρομένων τῶν φλεβῶν;

¹ βραδύτερα Forster : βραχύτερα Ruelle.

PROBLEMS, XI. 36-41

dissolves this chilling effect, but nervousness produces it; for nervousness is a kind of fear and fear is a chilling.

Why is it easier to hear inside a house from the 37 outside than outside from the inside? Is it because sound travelling from the inside passes through a vast empty space, and so is scattered, so that each individual part cannot be heard, or at any rate is heard to a smaller extent? But the voice, travelling from without into a smaller space where the air is stationary, enters in a compact mass, so that being greater it is more easily heard.

Why are stammerers melancholic? Is it because 38 melancholy is due to following the imagination quickly, and this is a characteristic of stammerers? For the impulse to speak precedes the capacity to do so, as the mind is following the image too quickly. The same is true of those who lisp; for in their case these organs are too slow. There is evidence for this; for this is the characteristic of men when drunk that they follow their imaginations and not their intelligence.

Why do leeks assist clear speech, since we find this 39 true even with partridges? Is it because, whereas boiled garlic produces smoothness, leeks have a certain glutinousness? This cleans out the larynx.

Why do all other creatures make shriller sounds the 40 more vehement they are, but man when he is weak? Is it because he moves less air, but this travels quickly, and what travels quickly produces a shrill sound?

Why do we hear more clearly when we check the 41 breath than when we exhale? This is why in hunting they advise one not to breathe. Is it because when the veins are distended the perception mounts up-

903 b

καθευδόντων γὰρ κάτω· διὸ καὶ μάλλον τε ἐκ-
 πνέουσιν καθεύδοντες ἢ εἰσπνέουσι, καὶ ἀνήκοοί
 904 a εἰσιν. ἢ καὶ τὸ αἷμα ἀνέρχεται ἐκπεπνευκότος,
 ὥστε κενοῦται τὰ κάτω; ἀκούουσι δὲ τῷ κενῷ.
 ἢ ὅτι ὁ φυσιασμός ψόφος τίς ἐστίν, οὗτος δὲ ἐν
 τῷ ἐκπνεῖν γινόμενος κωλύει ἀκούειν.

Διὰ τί θᾶπτον μὲν ψοφοῦσι καὶ πηδῶσιν οἱ μικροὶ 42
 5 ἄλλες, μείζω δὲ ψοφοῦσι καὶ πηδῶσιν οἱ μεγάλοι;
 ἢ διότι οἱ μὲν ταχὺ σχίζονται (οὐ γὰρ πολὺ ὁ δεῖ
 διελθεῖν τῷ πυρί) διὰ τὴν μικρότητα, οἱ δὲ βραδέως·
 μείζον γὰρ ἔργον τὸ μείζον διασχίσει· ἢ τὸ μικρόν;
 ψοφεῖ δὲ ὁ μὲν μικρὸς μικρόν, ἢ γὰρ πληγὴ μικρά,
 10 ὁ δὲ μείζων μέγала, μέγала γὰρ ἢ πληγὴ· ὁ δὲ
 ψόφος πληγὴ ἐστίν. καὶ πηδᾶ δὲ μάλλον τὸ ἰσχυρό-
 τερον, ἂν πληγείη· ἥττον γὰρ ἐνδίδωσιν.

Διὰ τί, εἰς πολὺ πῦρ ἐμβάλη τις τὸ αὐτὸ 43
 μέγεθος ἄλός, ἥττον ψοφεῖ ἢ οὐ ψοφεῖ; ἢ
 ὅτι φθάνει κατακαυθεῖς πρὶν σχισθῆναι; καίεται
 15 μὲν γὰρ τῷ τὸ ὑγρὸν ἀναλωθῆναι, ψοφεῖ δὲ τῷ
 σχισθῆναι.

Διὰ τί οἱ χασμώμενοι ἥττον ἀκούουσιν; ἢ ὅτι 44
 τὸ πνεῦμα ἐναπολαμβάνουσιν, τὸ δὲ ἀπολαμβανό-
 μενον πνεῦμα περὶ τὰ ὦτα ἀθροίζεται; σημεῖον
 δέ· ἐν γὰρ τοῖς ὡσὶ ψόφος γίνεται ὅταν χασμη-
 20 σώμεθα. τὸ δὲ ἀπολαμβανόμενον πνεῦμα κωλύει
 ἀκούειν. ἔτι δὲ καὶ φωνὴ τις γίνεται τῶν χασμω-
 μένων· τοῦτο δὲ κωλυτικὸν τοῦ ἀκούειν. καὶ
 συμπίεζεσθαι ἀναγκαῖον τὰς ἀκοὰς διασπωμένου
 τοῦ στόματος.

Διὰ τί τῆς φωνῆς, ἐπειδὴ ῥύσις τίς ἐστι, φύσιν 45
 ἐχούσης ἄνω φέρεσθαι, μάλλον ἐστίν εὐήκοος

wards? For when we are asleep it descends. That is why men asleep exhale more than they inhale, and do not hear. Or does the blood also mount when we exhale, so that the parts below are emptied? For we hear in a void. Or is it because breathing itself is a sound, and when this takes place in exhaling it prevents one from hearing?

Why do small quantities of salt crackle and jump 42 more quickly, while large quantities crackle and jump more violently? Is it because the former split quickly owing to the small quantity (for there is not a large quantity for the fire to pass through), but the latter slowly; for it is a greater task to split the large quantity than the small? The small quantity then, crackles little, for the impact is slight, but the larger a great deal, because the impact is great; for the sound is an impact. The stronger leaps more violently, if it is struck; for it is less inclined to give way.

Why is it that if a fire is large, the same quantity 43 of salt thrown into it makes less noise or no noise at all? Is it because it is burned up before it splits? It is burned up because the moisture in it is expended, but it only makes a noise when it splits.

Why do men hear less when they yawn? Is it 44 because they check the breathing, and the checked breath collects about the ears? There is evidence for this; for when we yawn, there is a sound in our ears. But the checking of the breath prevents us from hearing. Moreover, there is a noise made by those who yawn; and this prevents them from hearing. The distention of the mouth also must contract the hearing.

The voice being naturally a flow is by nature made 45 to travel upwards. Why is it, then, that it is easier

904 a

25 ἄνωθεν κάτω ἢ κάτωθεν ἄνω; ἢ ὅτι ἡ φωνὴ ἀήρ
 τίς ἐστὶ μεθ' ὑγροῦ· βαρυνόμενος οὖν οὗτος ὑπὸ
 τοῦ ὑγροῦ φέρεται κάτω καὶ οὐκ ἄνω· τοῦ γὰρ
 ὑγροῦ κατὰ φύσιν ἡ κάτω φορά; διὸ τοῖς κάτω
 μᾶλλον ἀκούεται. ἢ τοῦτο μὲν ὑπὸ τῆς τοῦ ζώου
 φωνῆς μόνον γίνεται (αὕτη γὰρ μεθ' ὑγροῦ), τὸ δὲ
 30 συμβαῖνόν ἐστὶ καὶ ἐπὶ τῶν ἄλλων ψόφων; καθ-
 ἄπερ οὖν ἡ ὄψις, εἰ μὲν ἄνωθεν κάτω προσπέση,
 τὴν ἀνάκλασιν ἄνω ποιεῖται, κάτωθεν δὲ ἄνω
 προσπεσοῦσα ἀνεκλάσθη κάτω, τὸν αὐτὸν τρόπον
 ἡ φωνὴ ἢ φύσιν ἔχουσα ἄνω φέρεσθαι, προσκόψασα
 35 τῷ ἐξ ἐναντίας ἀέρι, βιάζεσθαι μὲν οὐ δύναται
 πλείονα ὄντα καὶ βαρύτερον, ἀνακλασθεὶς δὲ ὁ
 κινηθεὶς ἀήρ ἐπὶ τοῦναντίον ἠνέχθη κάτω, διὸ
 καταχεόμενος ἀκούεται κάτω μᾶλλον. τοιοῦτο δὲ
 καὶ τὸ περὶ τὴν ἠχὴν συμβαῖνόν ἐστίν, ἀνάκλασις
 τῆς φωνῆς ἐπὶ τοῦναντίον.

904 b Διὰ τί μεθυόντων μᾶλλον ἀπορρήγνυται ἡ φωνὴ 46
 ἢ νηφόντων; ἢ διὰ τὸ πεπληρῶσθαι ταχέως ἀπορ-
 ρηγνύασι τὴν φωνήν; σημεῖον δὲ τούτου· οὔτε
 γὰρ οἱ χοροὶ μελετῶσιν ἐξ ἀρίστου οὔτε οἱ ὑπο-
 5 κριταί, ἀλλὰ νήστευσι ὄντες. ἐν δὲ τῇ μέθῃ πληρέ-
 στεροι ὄντες εὐλόγως μᾶλλον ἀπορρήγνυνται τὰς
 φωνάς.

Διὰ τί ποτε τῶν ὀξύτερων φωνῶν πορρώτερον 47
 ἀκούουσιν; ἢ διότι τὸ ὄξύ ἐν φωνῇ ταχύ ἐστὶ,
 θᾶπτον δὲ κινεῖται τὰ βία μᾶλλον φερόμενα, τὰ
 10 δὲ σφοδρότερον φερόμενα ἐπὶ πλέον φέρεται;

Διὰ τί κατέχοντες τὸ πνεῦμα μᾶλλον ἀκούομεν; 48
 ἢ ὅτι ἡ ἀνάπνευσις ψόφον τινὰ παρέχει; εἰκότως

to hear below from above, than above from below? Is it because the voice is air combined with moisture? Since, therefore, this is weighed down by moisture it is carried downwards and not upwards; for the natural tendency of moisture is downwards. So it is more easy for those below to hear. Or is this true only of the voice of the living creature (for this is combined with moisture), or is this phenomenon true of other sounds also? For just as vision, if it strikes downwards from above, has a refraction upwards, but is refracted downwards if it strikes upwards from below, in the same way the voice, which naturally inclines to travel upwards, striking the air which opposes it, cannot force its way through (for the air is greater in quantity and heavier), but the air which is moved is refracted and carried downwards in the opposite direction; hence as it flows downwards it is heard more distinctly below. Just the same thing occurs with the echo, a refraction of the voice in a contrary direction.

Why is the voice of the drunken more cracked than 46 that of the sober? Does their voice crack quickly because they are filled? There is evidence for this; for neither choruses nor actors rehearse after breakfast, but when fasting. But as men in drink are fuller, their voices naturally break more.

Why can one hear a shrill voice at a greater dis- 47 tance? Is it because in voice shrillness is speed, and those things which travel under compulsion are moved more rapidly, and those which travel violently travel further?

Why do we hear more distinctly when we hold 48 the breath? Is it because breathing itself makes a sound? Naturally therefore we hear better when

904 b

οὖν τότε μάλλον ἀκούομεν, ὅταν ἤττων ὁ ψόφος ἢ ἤττων γὰρ ὁ ψόφος, ὅταν κατέχωμεν τὸ πνεῦμα.

15 Διὰ τί τὸ μὲν φῶς οὐ διέρχεται διὰ τῶν πυκνῶν, 49
λεπτότερον ὄν καὶ πόρρω ἰόν¹ καὶ θᾶπτον, ὁ δὲ
ψόφος διέρχεται; ἢ διότι τὸ μὲν φῶς κατ' εὐθείαν
φέρεται, ὥστε ἂν ἀντιφράξῃ τι τὴν εὐθυωρίαν,
ὅλως ἀποκέκλειται, ὁ δὲ ψόφος φέρεται καὶ
20 οὐκ εὐθὺ διὰ τὸ πνεῦμα εἶναι; διὸ πανταχόθεν
ψοφοῦντος ἀκούομεν, καὶ οὐ μόνον τῶν κατ'
εὐθυωρίαν τοῖς ὤσιν.

Διὰ τί ποτε οἱ μὲν γελῶντες βαρὺ φθέγγονται, 50
οἱ δὲ κλαίοντες ὀξύ; ἢ διότι ἀπὸ τῶν συντόνων
ὀξεῖα ἢ φωνή, τὸ δὲ ὀξύ ἐστὶν ἀσθενές; ἄμφω δὲ
25 ταῦτα μάλλον τοῖς κλαίουσιν ὑπάρχει· καὶ γὰρ
συντέτανται μάλλον οἱ κλαίοντες καὶ ἀσθενέστεροί
εἰσιν.

Διὰ τί, εἴπερ ἢ φωνὴ ἀήρ τις ἐσχηματισμένος 51
ἐστί, καὶ φερομένη διαλύεται πολλάκις τὸ σχῆμα,
ἢ δὲ ἠχώ, ἢ γίνεται πληγέντος τοῦ τοιούτου πρὸς
30 τι στερεόν, οὐ διαλύεται, ἀλλὰ σαφῶς ἀκούομεν;
ἢ διότι ἀνάκλασις ἐστὶν, οὐ κατάκλασις; τοῦτο
δὲ ὄλον ἀφ' ὄλου. εἶτα τὸ πάθος ἀφ' ὁμοίου· ἀπὸ
γὰρ τοῦ ἀέρος ἀνακλᾶται ἐν τῷ κοίλῳ, οὐκ ἀπὸ
τοῦ κοίλου.

Διὰ τί ἐνός τε καὶ πολλῶν φθεγγομένων ἅμα 52
35 οὔτε ἴσος ὁ φθόγγος, οὔτε ἐπὶ πλείον γεγωνόσιν
ὡς κατὰ λόγον εἰς τὸ πόρρω; ἢ ὅτι ἕκαστος τὸν
καθ' αὐτὸν ἀέρα προωθεῖ, ἀλλ' οὐ τὸν αὐτόν, πλὴν
ἐπὶ μικρόν; ὅμοιον δὲ συμβαίνει ὥσπερ ἂν εἰ
πολλοὶ μὲν εἶεν οἱ βάλλοντες, ἕκαστος μέντοι λίθῳ

¹ ἰόν Bonitz: ὄν Ruelle.

there is less sound ; and there is less sound when we hold the breath.

Why is it that light does not pass through anything 49 thick, although it is less substantial and travels farther and more quickly, but sound does pass through ? Is it because light travels in a straight line, so that, if anything obstructs its straight course, it is completely shut off, whereas sound can also travel in a line which is not straight because it is breath ? So we hear sounds from any direction, and not only those which fall on our ears in a straight line.

Why do those who laugh utter a deep sound, but 50 those who weep a shrill one ? Is it because the voice which comes from those who are in a state of strain is shrill, and a shrill voice is weak ? Both these conditions are present with those who weep ; for those who weep are more under strain and weaker.

Why does the voice, since it is only air which has 51 assumed a shape, often lose its shape as it travels, but an echo, which occurs when air in this condition strikes something hard, does not lose its shape, but we hear it distinctly ? Is it because an echo is a refraction and not a dispersion ? So it returns to us whole. Again, the refraction is similar to the source from which it proceeded ; for it is refracted from the air in the hollow and not from the hollow itself.

Why is it that, when one person speaks and a 52 number speak at once, the sound is not the same, nor will it travel farther in proportion to the number speaking ? Is it because each individual thrusts forward the air in front of himself, and they do not all move the same air, except for a short distance ? It is the same effect as if there were a number of men throwing, but each, or at any rate most of them, threw

905 α ἑτέρω ἢ οἷ γε πλείστοι. οὔτε γὰρ ἐκεῖ πόρρω οὐθὲν ἀφίξεται βέλος, ἢ οὐ κατὰ λόγον, οὔτε ἐνταῦθα· οὐ γὰρ ἑνὸς ἢ τοσαύτη φωνή, ἀλλὰ πολλῶν. ἐγγύθεν μὲν οὖν κατὰ λόγον πολλή φαίνεται ἢ φωνή (καὶ γὰρ τὰ βέλη πλείω τεύξεται τοῦ αὐτοῦ), πόρρωθεν δὲ οὐκέτι.

β Διὰ τί ἀγωνιῶντες μὲν βαρύτερον φθέγγονται, 53 φοβούμενοι δὲ ὀξύτερον; καίτοι καὶ ἡ αἰδῶς φόβος τίς ἐστίν. ἢ διαφέρει πολὺ τὸ πάθος; οἱ μὲν γὰρ αἰδούμενοι ἐρυθριῶσιν (ἢ δὲ ἀγωνία αἰσχύνη τίς ἐστίν), οἱ δὲ φοβούμενοι ὠχριῶσιν. φανερόν οὖν ὅτι τοῖς μὲν φοβουμένοις ἐκλείπει 10 ἄνωθεν τὸ θερμόν, ὥστε κινεῖ ἀσθενὲς ὄν ὀλίγον αἶρα τὸ πνεῦμα, τὸ δὲ ὀλίγον ταχὺ φέρεται, τὸ δὲ ταχὺ ἐν φωνῇ τὸ ὀξύ· τοῖς δὲ αἰδουμένοις ἄνω ἔρχεται τὸ θερμόν περὶ τὰ στήθη. σημεῖον δὲ ὅτι γίνονται ἐξέρυθροι. πολὺν δὲ κινεῖ αἶρα ἢ πολλή 15 δύναμις, τὸ δὲ πολὺ βραδέως φέρεται, τὸ δὲ βραδὺ ἐν φωνῇ βαρύ.

Διὰ τί ἰσχνόφωνοι γίνονται; ἢ αἴτιον ἢ κατὰ- 54 ψυξίς τοῦ τόπου ᾧ φθέγγονται, καὶ ὥσπερ ἀποπληξία τοῦ μέρους τούτου ἐστίν; διὸ καὶ θερμαινόμενοι ὑπὸ οἴνου καὶ τοῦ λέγειν συνεχῶς ῥᾶον συνείρουσι τὸν λόγον.

20 Διὰ τί μόνον τῶν ἄλλων ζώων ἄνθρωπος γίνεται 55 ἰσχνόφωνον; ἢ ὅτι λόγου κοινωνεῖ μόνον, τὰ δὲ ἄλλα φωνῆς; οἱ δὲ ἰσχνόφωνοι φωνοῦσι μὲν, λόγον δὲ οὐ δύνανται συνείρειν.

Διὰ τί τοῦ μὲν χειμῶνος ὀξύτερον φθέγγονται 56 25 καὶ νήφοντες, θέρους δὲ καὶ μεθύοντες βαρύτερον; ἢ ὅτι ὀξυτέρα μὲν ἐστίν ἢ ταχύτερα, ταχύτερα δὲ ἐστίν ἢ ἀπὸ συντεταμένου φωνῆ; τῶν δὲ νηφόντων

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a different stone. For in that case no missile will travel far, or at any rate not in proportion to the numbers, nor will it in the other case. For the loud voice is not of one but of many. So from close by the voice sounds proportionately loud (just as a number of missiles will strike the same spot), but at a distance it will not be so.

Why do men speak in a deeper voice when nervous, 53 but in a shriller voice when afraid? Yet shame is a kind of fear. Or is it really a very different affection? For those who feel shame blush (nervousness is shame in a sense), but the frightened grow pale. So it is obvious that with the frightened the heat leaves the upper regions, so that the breath being weak moves but little air, but that which is small travels fast, and what is fast in voice is shrill; but in those who feel shame the heat about the chest rises. This is proved by the fact that they blush. But a considerable force moves much air, and a great mass travels slowly, and what is slow in voice is deep.

Why do men stammer? Is the chilling of the part 54 with which they speak responsible for it, which acts as a paralysis of that part? So when heated by wine and by continuous talking they connect their words more easily.

Why is man the only living creature which stam- 55 mers? Is it because he alone has a share of speech, but the other animals only of voice? But stammerers produce voice but cannot connect their words.

Why do men speak more shrilly in the winter and 56 when they are sober, but in a deeper voice in the summer and when they are drunk? Is it because a more rapidly travelling voice is shriller, and the voice which comes from that which is in a state of tension

905 a

καὶ ἐν τῷ χειμῶνι τὰ σώματα συνέστηκε μᾶλλον ἢ μεθυόντων καὶ ἐν τῷ θέρει. τὸ γὰρ θερμὸν καὶ αἰ ἀλέαι διαλύουσι τὰ σώματα.

30 Διὰ τί ἡ φωνὴ ὕστατον τελειοῦται τοῖς ἀνθρώποις 57 τῶν φθεγγομένων; ἢ διότι πλείστας ἔχει διαφορὰς καὶ εἶδη; τὰ γὰρ ἄλλα ζῶα ἢ οὐθὲν γράμμα ἢ ὀλίγα διαλέγονται. τὸ δὲ ποικιλώτατον καὶ πλείστας ἔχον διαφορὰς ἀνάγκη ἐν πλείστῳ χρόνῳ ἀποτελεῖσθαι.

85 Διὰ τί ἡ μὲν ὄψις οὐ διέρχεται διὰ τῶν στερεῶν, 58 ἡ δὲ φωνὴ διέρχεται; ἢ ὅτι τῆς μὲν ὄψεως μία φορὰ ἢ κατ' εὐθείαν (σημεῖον δὲ αἶ τε τοῦ ἡλίου ἀκτῖνες, καὶ ὅτι ἐξ ἐναντίας μόνον ὁρῶμεν), τῆς δὲ φωνῆς πολλαί; ἀκούομεν γὰρ πανταχόθεν. ὅταν 40 οὖν κωλυθῆ κατ' εὐθείαν ἐκπίπτειν διὰ τὸ μὴ κατ' 805 b ἀλλήλους εἶναι τοὺς πόρους, ἀδυνατεῖ διορᾶν. ὁ δὲ ἀήρ καὶ ἡ φωνή, ἅτε πανταχοῦ φερομένη, διὰ παντὸς διαπίπτει καὶ ἀκούεται. ἐν δὲ τοῖς ὑγροῖς αἰ μὲν ὄψεις διορῶσιν, αἰ δὲ φωναὶ οὐκ ἀκούονται ἢ μόλις, λεπτοτέρου ὄντος τοῦ ὑγροῦ ἢ τῆς γῆς, 5 ὅτι οἱ πόροι μικροὶ καὶ πυκνοὶ καὶ κατ' ἀλλήλους, ὥστε οὐ κωλύεται ἡ ὄψις εὐθυπορεῖν. διὰ τοῦτο καὶ διὰ μὲν τῆς ὑέλου διορᾶται πυκνῆς οὕσης, διὰ δὲ τοῦ νάρθηκος ἀραιοῦ ὄντος οὐ διορᾶται. ἔτι τῆς μὲν οἱ πόροι κατάλληλοι, τοῦ δὲ παραλλάττοντες· οὐθὲν δ' ὄφελος εἶναι μεγάλους, εἰ μὴ κατ' 10 εὐθείαν ὦσιν. ἡ δὲ φωνὴ οὐκ ἀκούεται, ὅτι ἐλάττω τὰ διάκενα τὰ ἐν τῷ ὕδατι τοῦ ἀέρος, ὥστε οὐ δύναται δέχεσθαι, οὐδὲ διέναι τὴν φωνὴν ἀλλ' ἢ μόλις [ἢ μετὰ φωνῆς]. ἡ γὰρ φωνὴ ἀήρ τις. οὐ

is swifter? With the sober and in winter the body is more set than with the drunk and in summer. For heat and warmth relax the body.

Why does the voice among men come to perfection 57 later than in any other creature which makes a sound? Is it because in the case of man the voice has the greatest number of differences and forms? The other animals pronounce no letters or very few. Now what is most variable and has the greatest number of different forms must develop in the longest time.

Why cannot sight penetrate through hard objects, 58 whereas voice can? Is it because sight travels only in a straight line (the rays of the sun prove this, and the fact that we can only see them from directly opposite), but sound travels on many paths? For we hear from every direction. When, therefore, sight cannot reach us in a straight line because there is no passage between us and the object, it is impossible to see through. But air and voice, as they travel in every direction, pass through everything and are audible. But through liquids sight can penetrate, but voices are not heard or very little, although moisture is rarer than earth, because the passages are small and frequent and continuous, so that sight is not prevented from travelling in a straight line. This is why it is possible to see through glass which is dense, but not through a fennel stalk which is porous. In the former case there are continuous passages, but in the latter these are variable, and their size is of no advantage, unless they are in a straight line. But the voice is not heard, because the empty spaces are too small for the air, so that they cannot receive it, nor let the voice pass through except with difficulty. For the voice is a kind of air. For that

905 b

γὰρ ἅπαν τὸ μανότερον διτικώτερον, ἂν μὴ καὶ οἱ πόροι ὧσιν ἀρμόττοντες τῷ διόντι, ὥστ' οὐδὲ
 15 συνικώτερον εἰς αὐτό, ἂν μὴ δεκτικοὶ ὧσιν οἱ πόροι τῶν σωμάτων. καίτοι τὸ μανὸν μαλακὸν καὶ δυνάμενον εἰς αὐτὸ συνιέναι. ἀλλ' ἔνια κωλύεται διὰ τὴν μικρότητα τῶν πόρων, οἷον ἢ ὕελοσ· ταύτης γὰρ οὐ συνάγονται, μανοτέρας οὔσης τοῦ
 20 νάρθηκος, διὰ τὴν εἰρημένην αἰτίαν. ὁμοίως δὲ καὶ τὸ ὕδωρ καὶ εἴ τι ἄλλο τοιοῦτον· ὥστε καὶ τόδε φανερόν, διότι τοῦ μανοῦ καὶ μαλακοῦ ἢ ταυτοῦ ὄντος ἢ παραπλησίου τὴν φύσιν, οὐ τὸ μανότερον μᾶλλον συνάγεται εἰς αὐτό· ἢ γὰρ αὕτη αἰτία πάντων.

Διὰ τί γίνεται ἐλάττων μὲν ἢ φωνὴ ἐξαιρουμένων, 59
 25 ὁμοία δὲ τὸν χαρακτήρα; ἢ ὅτι ἐμέμικτο αὐτοῖς; τὸ δὲ μεμιγμένον οὐ τῇ μὲν ἐστὶ τῇ δὲ οὐ, ἀλλὰ πάντη. ὁμοίως οὖν πανταχόθεν ἐξαιρουμένων συνέρχεται [ὁμοίως], ὥστ' ἐλαττόν τε ἀνάγκη καὶ ὁμοιον εἶναι.

Διὰ τί ἰσχνόφωνοι γίνονται; πότερον διὰ θερ- 60
 30 μότητα προπετέστεροί εἰσιν, ὥστε προσπταίοντες ἐπίσχουσιν, ὥσπερ οἱ ὀργιζόμενοι; καὶ γὰρ οὗτοι πλήρεις ἀσθματος γίνονται. πολὺ μὲν οὖν τὸ πνεῦμα συμβαίνει. <ἢ> διὰ τὴν ζέσιν τοῦ θερμοῦ ἀσθμαίνουσιν, διὰ τὸ πολὺ εἶναι καὶ μὴ φθάνειν ὑπεξίον τῷ τῆς ἀναπνοῆς καιρῷ; ἢ μᾶλλον τοῦ-
 35 ναντίον κατάψυξις ἢ θερμότης τοῦ τόπου ᾧ φθέγονται, ὥσπερ ἀποπληξία τοῦ μέρους τούτου; διὸ καὶ θερμαινόμενοι ὑπὸ οἴνου καὶ τοῦ λέγειν συνεχῶς ῥᾶον συνείρουσι τὸν λόγον.

Διὰ τί τοῦ χειμῶνος αἱ φωναὶ βαρύτεραι; ἢ ὅτι 61

which is rarer is not necessarily more easy to pass through, unless the passages are also suitable to what is passing through, so that, unless the passages can receive solid bodies, it is not more compressible either. And yet what is rare is soft and compressible. But in some cases—such as glass—compression is impossible because of the smallness of the channels ; for, although it is rarer than the fennel stalk, its channels are not contracted for the reason given above. The same thing is true of water and any other similar substance ; so that it is obvious that, though the rare and soft are of the same or a similar nature, it does not follow that the rarer a thing is the more it admits of contraction ; for the cause of all these phenomena is the same.

Why does the sound become less, if some singers 59 are taken away, but yet similar in character ? Is it because the voice had already combined with the others ? For that which is combined is not so in one part and not in another, but in every part. When, then, some voices are completely removed, the sound is combined in the same way as before, so that it must be both smaller and similar.

Why do men stammer ? Is it because they are too 60 hurried owing to the heat, so that they stumble and hesitate, just as men do when they are angry ? For these too are full of short breathing. So the breath which collects is considerable. Or do they pant because of the boiling of the heat, because it is considerable and cannot escape before the proper moment for breathing ? Or on the contrary is it rather a chilling than a heating of the part with which they speak, like apoplexy in this part ? So when heated by wine and continuous talking they more easily connect their words.

Why are voices deeper in the winter ? Is it because

905 b παχύτερος ὁ αἶρ, παχυτέρου δὲ ὄντος βραδυτέρα ἢ
 40 κίνησις, ὥσθ' ἢ φωνὴ βαρυτέρα; ἢ διότι διὰ τῶν
 908 a στενωῶν βραδύτερον χωρεῖ ὁ αἶρ, συμφράττεται δὲ
 τὸ περὶ τὸν φάρυγγα ὑπὸ τε τοῦ ψυχροῦ καὶ τοῦ
 ἐπιρρέοντος φλέγματος.

Διὰ τί τὰ παιδιά καὶ αἱ γυναῖκες καὶ οἱ εὐνοῦχοι 62
 καὶ οἱ γέροντες φθέγγονται ὀξύ; ἢ ὅτι θάπτων
 5 κίνησις ἐστὶν ἢ ὀξυτέρα; ἔστι δὲ τὸ αὐτὸ πλείον ὄν¹
 δυσκινητότερον, ὥστε οἱ ἐν ἀκμῇ πλείω συνεπι-
 σπῶνται τὸν αἶρα· οὗτος οὖν βραδύτερον ἰὼν
 βαρυτέραν παρασκευάζει τὴν φωνήν. ἐν δὲ τοῖς
 παιδίοις καὶ εὐνούχοις διὰ τὸ ἐλάττω ἔχει ἐναν-
 τίως. τρέμειν δὲ τοὺς πρεσβύτας οὐ δυναμένους
 10 κρατεῖν, ὥσπερ τοῖς ἀδυνάτοις καὶ παιδίοις, ὅταν
 μακρὸν ξύλον λάβωσιν ἀπ' ἄκρου, τὸ ἕτερον ἄκρον
 σείεται διὰ τὸ μὴ κρατεῖν. (διὰ τοῦτο καὶ οἱ
 πρεσβῦται τρέμουσιν διὰ τὸ μηκέτι κρατεῖν.) τὸ
 αὐτὸ δὲ ὑποληπτέον καὶ ἐπὶ τῶν ἀγωνιώντων καὶ
 φοβουμένων καὶ ῥιγώντων αἴτιον τοῦ τρόμου τῆς
 φωνῆς. τοῦ γὰρ ἔχοντος τὴν φωνὴν τοιαύτην, τοῦ
 15 θέρμου διὰ² τῶν τοιούτων παθῶν εἴσω περιεστη-
 κότος τοῦ πλείστου, λοιπὸν ὀλίγον ὄν οὐ δύναται
 κρατεῖν τῆς φωνῆς· διὸ καὶ σείεται καὶ τρέμει. διὸ
 καὶ οἱ τεχνικοὶ τῶν συνειδότην ὅτι ἀγωνιῶσι μικρὸν
 διαλέγονται ἀπ' ἀρχῆς, καὶ ἄχρι οὗ ἂν καταστῶσιν·
 20 μικρᾶς γὰρ οὔσης τῆς φωνῆς ῥᾶον κρατοῦσιν.

¹ πλείον ὄν Ross : πλείονος Ruelle.

² τοῦ θέρμου διὰ inserted by Forster from Th. G.

PROBLEMS, XI. 61-62

the air is thicker, and when it is thicker the movement is slower, so that the voice is deeper? Or is it because the air travels more slowly through narrow channels, and the region about the larynx is obstructed by the cold and the phlegm flowing into it?

Why do children, women and eunuchs and old men 62 speak in a shrill voice? Is it because a shrill voice implies a faster movement? Now the same thing in larger quantity is more difficult to move, so that those who are in the prime of life draw in more air; this therefore travelling more slowly produces a deeper voice. But in children and eunuchs, because they have less breath, the opposite effect takes place. Because old men have not control they tremble, just as with weak persons and children, when they seize a long plank by the end, the other end quivers because they cannot control it. (This is why old men tremble because they no longer have control.) This same thing must be assumed in the nervous, the frightened and the shivering as the cause of the trembling of the voice. For in one whose voice is in this state, since most of the heat has collected within as a result of such conditions, the rest being small in quantity cannot control the voice; hence it shakes and trembles. This is why artists who are conscious that they are nervous speak in a low voice to begin with, and until they have settled down; for they can control the voice more easily when it is low.

ΙΒ

ΟΣΑ ΠΕΡΙ ΤΑ ΕΥΩΔΗ

906 a

Διὰ τί τῶν θυμιαμάτων ἤττον αἰσθάνονται πλη- 1
 σίον ὄντες; πότερον ὅτι ἀκρατεστέρα κερασθεῖσα
 25 ἢ ἀπόρροια τῷ ἀέρι ἠδίων, ὥσπερ ἢ σμύρνη τῶν
 ἰατρῶν; ἢ καὶ τοῦναντίον εἶη ἄν, ὥστε ἀφαιρεῖσθαι
 τὸ πῦρ τὴν ὀσμὴν διὰ τὸ καίειν; ἢ γὰρ ὀσμὴ
 θυμιωμένων. διὸ καὶ ἐπὶ τῶν ἀνθράκων οὐκ ὄζει,
 πορρώτερον δὲ καθαρώτερον φαίνεται καὶ λεπτό-
 τατον τοῦτο.

30 Διὰ τί αἱ ὀσμαι ἤττον εὐώδεις τῶν θυμιαμάτων 2
 καὶ τῶν ἀνθῶν ἐκ τοῦ ἐγγύς; πότερον ὅτι συναπ-
 ἔρχεται τῇ ὀσμῇ καὶ γῆς μόρια, ἃ προκαταφέρεται
 διὰ βάρος, ὥστε καθαρὰ πορρώτερον γίνεται ἢ
 ὀσμῇ; ἢ οὔτε ἐγγύς οὔσης τῆς ἀρχῆς πλείστον
 35 γίνεται τὸ ρέον, οὔτε λίαν πόρρω; τὸ μὲν γὰρ
 οὔπω πολὺ, τὸ δὲ διασπᾶται.

Λέγεται γὰρ ὡς εὐώδη γίνεται τὰ δένδρα εἰς 3
 ἅπερ ἄν ἢ ἱρις κατασκήψη. πότερον οὖν ἀληθές
 ἐστὶν ἢ ψεῦδος; καὶ εἰ ἀληθές, διὰ τίν' αἰτίαν <ἄν>¹
 906 b εἶη τὸ συμβαῖνον; ὅτι μὲν οὖν οὔτε πάντα οὔτε
 αἰεὶ, δῆλον· πολλάκις γὰρ ἢ ἱρις μὲν γέγονε, τὰ
 δὲ δένδρα οὐθὲν ἐπίδηλα φαίνεται. ὅταν τε γένηται
 τοῦτο, οὐκ ἐν πάσῃ γίνεται ὕλη, ἐπεὶ συμβαίνει γέ-
 ποτε· διὸ καὶ λέγεται. τὸ δ' αἴτιον κατὰ συμβεβηκὸς

¹ <ἄν> added by Richards.

BOOK XII

PROBLEMS CONNECTED WITH PLEASANT SMELLS

WHY do we smell burning spices less when we are 1 near to them ? Is it because the emanation becoming weaker when mixed with air is more pleasant, like the myrrh used by doctors ? Or would the opposite be true, so that the fire by burning it takes away the smell ? For the smell occurs when the perfume is burnt. Hence there is no smell on the coals, but farther away the smell appears to be purer and very light.

Why is the scent of burning spices and of flowers 2 less pleasant from near at hand ? Is it because bits of earth come away with the smell, which owing to their weight fall to the ground earlier, so that the scent is purer farther away ? Or is the emanation greatest neither when the source is very near, nor when it is very far away ? For, near by, it is not yet considerable, and farther away it is scattered.

It is said that trees upon which the rainbow has 3 fallen become scented. Is this true or false ? If it is true, what can be the cause of the occurrence ? It is obvious that it is not true of all trees nor in every case ; for often the rainbow has occurred but the effect on the trees is not at all noticeable. And when this does happen, it does not happen in every wood (for it does happen sometimes, and hence the saying). But the cause can only be ascribed to the rainbow

908 b
 5 τῆ ἱριδι ἀποδοτέον, ἄλλως τε καὶ εἰ μὴ ἐστὶ τις
 φύσις ἢ ἶρις, ἀλλὰ τῆς ὄψεως πάθος ἀνακλωμένης.
 γίνεται δέ, ὥσπερ ἐλέχθη, οὐχ ὅπως οὖν ἐχούσης
 τῆς ὕλης τὸ πάθος· οὔτε γὰρ ἐν τοῖς χλωροῖς δέν-
 10δροις οὔτε ἐν τοῖς αὔοις, ἀλλ' ἐν τῇ ἐμπεπρησμένη
 ὕλῃ φασὶν οἱ νομεῖς μετὰ τὰ ἐπὶ τῇ ἱριδι ὕδατα
 γίνεσθαι ἐπίδηλον τὴν εὐωδίαν, καὶ μάλιστα οὐ
 ἂν ἀσπάλαθος ἢ καὶ ῥάμνος καὶ ὦν τὰ ἄνθη εὐώδη
 ἐστίν. αἴτιον δὲ τῆς εὐωδίας ἐστίν, ὅπερ καὶ ἐπὶ
 τῆς γῆς· διαθέρμου γὰρ καὶ διακεκαυμένης οὔσης,
 ὃ ἂν ἐκφύσῃ, τὸ πρῶτον εὐῶδες ὄζει. τὰ γὰρ
 15 πυρούμενά πως τῶν ὑγρότητα ἐχόντων ὀλίγην
 εὐώδη γίνεται· πέττει γὰρ τὸ θερμὸν ταύτην. διὸ
 καὶ τῆς ὅλης γῆς τὰ πρὸς τὸν ἥλιον εὐωδέστερα
 τῶν πρὸς ἄρκτον ἐστίν. τούτων δὲ τὰ πρὸς ἑω
 τῶν πρὸς μεσημβρίαν, ὅτι γεώδης μᾶλλον ὁ τόπος
 ὁ περὶ τὴν Συρίαν καὶ Ἀραβίαν ἐστίν, ἢ δὲ Λιβύη
 20 ἀμμώδης καὶ ἀνικμος. δεῖ γὰρ μήτε πολλὴν εἶναι
 τὴν ἰκμάδα, ἀπεπτος γάρ ἐστιν ἢ πολλή, μήτε
 ἀνικμον, οὐ γὰρ γίνεται ἀτμῖς. ὃ συμβαίνει καὶ
 περὶ τὴν νεόκαυτον ὕλην καὶ τὸ γένος τοιαύτην
 ὥστε ἔχειν εὐωδίαν σὺν αὐτῇ. δηλοῖ δὲ τοῖς
 ἀνθεσιν· ἀφήσει γὰρ ἐν τούτοις τὴν ὀσμὴν. δοκεῖ
 25 δὲ ἐν οἷς ἂν ἐνσκήψῃ ἢ ἶρις γίνεσθαι, ὅτι οὐδὲν
 ἄνευ ὕδατος οἷόν τε γίνεσθαι· βραχεῖσά τε γὰρ ἢ
 ὕλη καὶ τῷ ἐνόντι θερμῷ πέψασα τὴν ἐν αὐτῇ
 γινομένην ἀτμίδα ἀφήσιν. οὔτε πολὺ τὸ ὕδωρ
 δεῖ εἶναι· ἐκκλύζει γὰρ τὸ πολὺ λίαν, καὶ σβέννυσιν
 τὴν θερμότητα τὴν ἐνυπάρχουσαν ἀπὸ τῆς πυρώ-

PROBLEMS, XII. 3

incidentally, especially since the rainbow does not really exist in nature, but is only an effect produced on the eye by refraction. But this phenomenon, as has been said, does not occur when the wood is in any sort of condition ; for it does not happen in fresh or dry trees, but the shepherds say that it is in burned wood that the sweet smell after the rain which accompanies the rainbow is noticeable, and especially where there are briars and brambles and shrubs which have a sweet scent. The reason of the sweet scent is the same as it is in the earth ; for when the earth is hot and burnt through, whatsoever grows from it is sweet-scented to begin with. For all things containing a little moisture have a sweet scent when they are warmed ; for the heat concocts the moisture. So all over the earth what faces the sun has a sweeter scent than what faces the north. Of these what faces east has a sweeter scent than what faces south, for the region of Syria and Arabia is more earthy, whereas Africa is sandy and waterless. The moisture must not be great (for a large quantity is difficult to concoct), nor must the ground be waterless, for then there is no evaporation. This happens also with newly-burned wood and with the kind which has naturally a sweet scent. It is also obvious in flowers ; for wood gives off its scent by means of them. But in the case of trees upon which the rainbow falls, it seems that nothing can occur without the presence of water ; for when the wood has been wetted, and then concocts the moisture within it by the heat which it contains, it gives off vapour which is being engendered in it. But the water must not be in great quantity ; for in large quantity it drenches it, and quenches the heat which is already present in it as a result of the burning, and

906 b

30 σεως, τὰ δὲ μετὰ τὴν ἴριν ὕδατα οὐ πολλὰ γίνεται, ἀλλὰ μέτρια ὡς εἶπειν. καὶ ἐὰν πολλαὶ γίνωνται ἴριδες, οὐ πολὺ γίνεται, ἀλλὰ πολλάκις μὲν, ὀλίγον δέ. διὸ εἰκότως τούτου γινομένου, οὐθὲν ἄλλο ὀρώντες διάφορον πλὴν τὴν ἴριν, ταύτη τὴν αἰτίαν προσέθεσαν τῆς εὐωδίας.

35 Διὰ τί τὰ ἄνθη καὶ τὰ θυμιώμενα πόρρωθεν 4
μᾶλλον ἤδιον ὄζει, ἐγγύθεν δὲ τὰ μὲν ποωδέστερον, τὰ δὲ καπνωδέστερον; ἢ ὅτι ἢ ὁσμὴ θερμότης τίς ἐστίν καὶ τὰ εὐώδη θερμά, τὸ δὲ θερμὸν κοῦ-
907 a φον, ὥστε διὰ μὲν τοῦτο πορρωτέρω διόντων ἀ-
μιγεστέρα γίνεται ἢ ὁσμὴ τῶν συμπαραπομένων ὁσμῶν ἀπὸ τῶν φύλλων καὶ τοῦ καπνοῦ, ὄντος ὕδατώδους ἀτμοῦ, πλησίον δὲ ὄντων τὰ μεμιγμένα αὐτοῖς συνόζει ἐν οἷς ἐστίν.

5 Διὰ τί πάντα μᾶλλον ὄζει κινούμενα; ἢ ὅτι 5
ἀναπίμπλησι πλείω ἀέρα ἢ ἡσυχάζοντα; δια-
πέμπεται οὖν ἢ ὁσμὴ θᾶπτον οὕτω πρὸς τὴν αἴσθησιν ἡμῶν.

Διὰ τί τοῦ χειμῶνος ἦπτον ὀσφραϊνόμεθα, καὶ 6
ἐν τοῖς πάγεσιν ἠκιστα; ἢ ὅτι ὁ ἀὴρ ἀκινήτοτερός
10 ἐστίν ἐν τῷ ψύχει; οὐκ οὐκ ἀφικνεῖται ὁμοίως ἢ
κίνησις ἢ ἀπὸ τοῦ σώματος τοῦ τὴν ὁσμὴν ἔχοντος
διὰ τὴν δυσκινήσιαν τῆς ἀπορροῆς καὶ τοῦ ἀέρος
ἐν ᾧ ἐστίν.

Διὰ τί δριμύτερον ὄζει τῶν ἀρωμάτων ἐπὶ τέφρας 7
θυμιωμένων ἢ ἐπὶ τοῦ πυρός, καὶ μᾶλλον καὶ πλείω
15 χρόνον τὴν αὐτῶν ὁσμὴν ἔχει ἐπὶ τῆς τέφρας
θυμιώμενα; ἢ ὅτι ἀπεπτοτέρα ἐστίν ἢ ὁσμὴ ἐπὶ
τῆς τέφρας· διὸ καὶ πλείων; τὸ δὲ πῦρ ταχὺ πέττον

PROBLEMS, XII. 3-7

the water after the rainbow is not great in quantity, but, so to speak, only moderate. Even if there is a succession of rainbows, the rain does not become considerable, but though it may fall a number of times it is only in small quantities. Naturally, therefore, when this occurs, as men see no varying condition except the rainbow, they ascribe to the rainbow the cause of the sweet scent.

Why do flowers and burning spices smell more 4 sweetly at a distance, whereas near by some smell more like grass and others more like smoke? Is it because scent is a kind of heat, and sweet-smelling things are hot; but heat is light, so that for this reason at a greater distance the scent is less mixed with concomitant smells due to leaves and smoke, which is a watery steam, but, when they are near by, the smells, which are mixed with the plants in which they are, are also perceptible.

Why do all things smell more when in motion? 5 Is it because they infect more air than when they are still? Hence the scent is more quickly transmitted to our perception.

Why do we perceive odours less in winter and particularly in frost? Is it because the air moves less in the cold? The movement, therefore, which arises from the body which produces the odour does not reach as far owing to the difficulty of setting in motion the emanation and the air in which it is.

Why do spices have a more acrid smell when they 7 are burned on ashes than upon fire, and when burned in this way keep their scent for a longer time? Is it because the scent is less concocted on ashes? Hence it is greater. But the fire, as it quickly concocts their

907 a

αὐτῶν τὴν δύναμιν ἀλλοιοῖ τὴν ὄσμήν· ἢ γὰρ πέψις ἀλλοίωσις ἐστὶν τοῦ πεπτομένου.

20 Διὰ τί ἡδιον ὄζει τῶν ῥόδων ὧν ὁ ὀμφαλὸς τραχὺς 8 ἐστὶν ἢ ὧν λείος; ἢ ὅτι μᾶλλον ὄζει ἡδὺ ὅσα τὴν φύσιν ἀπέληφε τὴν αὐτῶν; ἀκανθῶδες φύσει δὲ τὸ ῥόδον ἐστίν. διὸ μᾶλλον ἔχον τὰ κατὰ φύσιν ὄζει ἡδιον.

Διὰ τί αἱ ὀδμαὶ ἐγγύθεν ἤττον εὐώδεις καὶ 9
25 θυμιαμάτων καὶ ἀνθῶν; ἢ ὅτι πλησίον μὲν συναποφέρεται τὸ γεῶδες, ὥστε κεραυνύμενον ἀσθενεστέραν ποιεῖ τὴν δύναμιν, εἰς δὲ τὸ πόρρω καταφέρεται ἢ ὄσμή. διὰ ταῦτα δὲ καὶ τριφθέντα τὰ ἄνθη ἀπολλύουσι τὴν ὄσμήν.

Πότερον αἱ ὀσμαι καπνὸς ἢ ἀήρ ἢ ἀτμίς; δια- 10
30 φέρει γάρ, ἢ τὸ μὲν ὑπὸ τοῦ πυρός, τὸ δὲ καὶ ἄνευ τούτου γίνεται. καὶ πότερον ἀπὸ τῆς αἰσθήσεώς τι πρὸς ἐκεῖνα ἢ ἀπ' ἐκείνων πρὸς τὴν αἴσθησιν ἀφικνεῖται, αἰεὶ κινουῦν τὸν πλησίον ἀέρα; καὶ εἰ ἀπ' ἐκείνων ἀπορρεῖ, ἔδει ἔλαττον γίνεσθαι· καίτοι τὰ εὐωδέστατα ὀρώμεν μάλιστα διαμένοντα.

35 Διὰ τί δριμύτερον ὄζει μᾶλλον τῶν ἀρωμάτων 11 ἐπὶ τέφρας θυμωμένων ἢ ἐπὶ τοῦ πυρός; ἢ διότι ἀπεπτοτέρα ἢ ὄσμή ἐπὶ τῆς τέφρας· διὸ καὶ πλείων; πολὺ οὖν καὶ τοῦ γεώδους συναναθυμιᾶται καὶ γίνεται καπνός· τὸ δὲ πῦρ φθάνει ἐκκάον τὸ γεῶδες
907 b αὐτῶν, ὥστε ἢ ὄσμή καθαρωτέρα καὶ εἰλικρινῆς ἀφικνεῖται ἄνευ τοῦ καπνοῦ. διὸ καὶ τριβόμενα ἤττον εὐώδη τὰ ἄνθη· τὸ γὰρ γεῶδες καὶ ἢ τριψίς κινεῖ, καὶ ἢ βραδεῖα θερμότης οὐ φθείρει.

Διὰ τί τὰ εὐώδη οὖρητικὰ καὶ σπέρματα καὶ 12

PROBLEMS, XII. 7-12

force, causes a change in the scent, for the concoction causes a change in what is concocted.

Why do roses smell sweeter when their centres are 8 rough than when they are smooth? Is it because those roses smell more which have the characteristics of the rose most marked? Now the rose is by nature thorny. Thus being more in its natural condition, it smells sweeter.

Why is the scent both of spices and of flowers less 9 sweet near by? Is it because near by the earthy part is transmitted as well, so that being mixed it makes the power of the scent weaker, but the scent is carried to a distance. This is also the reason why flowers lose their scent if they are rubbed.

Are scents smoke or air or vapour? It makes a 10 difference, inasmuch as the first is due to fire, but the last arises without it. Also does something pass from the senses to the object or from the object to the senses, as it continually moves the neighbouring air? If it comes from the object, it should grow less; and yet we find that sweetest-smelling objects remain so for the longest time.

Why have spices that are burned on ashes a more 11 pungent odour than when burned on the fire? Is it because on the ashes the smell is less concocted and so it is greater? So much earthy matter is evaporated with them and becomes smoke. But fire burns out the earthy matter before it can escape, so that the scent arrives in a purer state and unmixed without the smoke. For this reason flowers that are rubbed become less scented, for the rubbing sets the earthy matter in motion, and the slow heat does not destroy it.

Why are all sweet-smelling seeds and plants 12

907 b
 5 φυτά; ἢ ὅτι θερμὰ καὶ λεπτά, τὰ δὲ τοιαῦτα
 οὐρητικά; ταχὺ γὰρ λεπτύνει ἢ ἐνοῦσα θερμότης,
 καὶ ἢ ὁσμὴ οὐ σωματώδης, ἐπεὶ καὶ τὰ μὴ εὐώδη,
 οἷον σκόροδα, διὰ τὴν θερμότητα οὐρητικά, μᾶλλον
 μέντοι τηκτικά. θερμὰ δὲ τὰ εὐώδη σπέρματα,
 διότι ὅλως ἢ ὁσμὴ διὰ θερμότητα γίνεται. ἀλλὰ
 10 τὰ δυσώδη ἄπεπτά ἐστιν· δεῖ δὲ μὴ μόνον θερμὰ
 εἶναι, ἀλλὰ καὶ εὐπεπτα, εἰ ἔσται οὐρητικά, ὅπως
 συγκατιόντα λεπτύνῃ τὰ ὑγρά.

Διὰ τί ποτε οἱ κεκραμένοι τῶν οἴνων ἡττον¹ τῶν 13
 ἀκράτων ὄζουσιν; ἢ ὅτι ὁ κεκραμένος ἀσθενέ-
 15 στερος τοῦ ἀκράτου ἐστίν; τὸ δὲ ἀσθενέστερον
 ὑπὸ πάντων ἐξίσταται τοῦ ἰσχυροτέρου. εἶτα ὁ
 κεκραμένος ἐστίν εὐπετέστερος τοῦ ἀκράτου.
 εὐπετέστερον δὲ ἐστίν ὑπάρξαι ὠτινιοῦν, καὶ
 ἐκλαβεῖν τι τῶν μὴ ὑπαρχόντων. ὁ μὲν οὖν
 ἄκρατος ὁσμώδης ἐστίν, ὁ δὲ κεκραμένος ἄνοσμος.

¹ ἡττον Forster : θᾶττον Ruelle.

PROBLEMS, XII. 12-13

diuretic? Is it because they are warm and light, and such things are diuretic? For the heat in them promotes digestion and the smell is not corporeal, since things which are not sweet-smelling, such as garlic, are diuretic because of their warmth, or rather because they cause melting. Sweet-smelling seeds are warm because the scent is generally engendered by means of heat, while evil-smelling things are uncooked. Substances, then, if they are to be diuretic, must be not only warm but also well-cooked, in order that they may digest the moist elements as they travel downwards with them.

Why does mixed wine smell less than unmixed? 13
Is it because mixed wine is weaker than unmixed? The weaker is more easily altered by anything else than the strong. Again, mixed wine is more easily affected than unmixed. By more easily affected I mean that it is easier for it to be attached to something else and for it to receive something which does not belong to it. So unmixed wine has a smell but mixed wine is scentless.

ΙΓ

ΘΣΑ ΠΕΡΙ ΤΑ ΔΥΣΩΔΗ

Διὰ τί τὸ μὲν οὔρον, ὅσα ἂν χρονίζηται ἐν τῷ¹
σώματι, δυσωδέστερον γίνεται, ἢ δὲ κόπρος ἦττον;
ἢ ὅτι ἢ μὲν ξηραίνεται μάλλον χρονιζομένη (τὸ
²⁵ δὲ ξηρὸν ἀσηπτότερον), τὸ δὲ οὔρον παχύνεται,
πρόσφατόν τε ὄν ὁμοιότερον τῷ ἐξ ἀρχῆς ἐστὶ
σώματι;

Διὰ τί τὰ δυσώδη τοῖς ἐδηδοκόσιν οὐ δοκεῖ²
ὄξει; ἢ διὰ τὸ συντετρῆσθαι τὴν ὄσφρησιν τῷ
στόματι κατὰ τὸν οὐρανὸν πλήρης ἢ αἴσθησις
³⁰ γίνεται ταχύ, καὶ τῆς τε ἔσω οὐκέθ' ὁμοίως
αἰσθάνεται (τὸ γὰρ πρῶτον αἰσθάνονται πάντες,
ὅταν δὲ ἀψωνται, οὐκέτι, ὥσπερ συμφυοῦς) καὶ
ἢ ἔξωθεν ἢ ὁμοία ἀφανίζεται ὑπὸ τῆς ἔσω;

Διὰ τί τριβόμενα τὰ ἄνθη δυσωδέστερα; ἢ διότι³
συμμίγνυται τῇ ὀσμῇ τὸ γεῶδες τὸ ἐν τῷ ἄνθει;
³⁵ Διὰ τί τῶν μὲν ζώων οὐθὲν εὐώδές ἐστιν ἔξω⁴
τῆς παρδάλιος (αὕτη δὲ καὶ αὐτοῖς τοῖς θηρίοις
φασὶ γὰρ αὐτῆς τὰ θηρία ἠδέως ὀσμᾶσθαι), φθειρό-
μενα δὲ καὶ δυσώδη ἐστίν, τῶν δὲ φυτῶν πολλὰ
καὶ φθειρόμενα καὶ αὐαινόμενα ἔτι μάλλον εὐώδη

BOOK XIII

PROBLEMS CONNECTED WITH UNPLEASANT SMELLS

WHY does urine become more evil-smelling the longer it remains in the body, while dung becomes less so? Is it because dung dries up with time (and the dry is less rotten), while urine grows thick, and fresh urine is more like the liquid it was to begin with?

Why do unpleasant odours seem not to smell to those who have eaten? Is it because, owing to the fact that the smell finds its way through the roof of the mouth, the senses are soon saturated, and have no longer perception of odour inside (for at first all can perceive the odour, but when they are in contact with it, they can no longer perceive it, as if it were part of them), and so the similar scent outside is overcome by that inside?

Why do rubbed flowers smell unpleasant? Is it because the earthy element in the flower has become mixed with the scent?

Why is it that no living creature has a pleasant smell except the panther (which is pleasant even to beasts; for they say that other beasts enjoy sniffing it), and when animals decompose they are also unpleasant, whereas many flowers, when they decay and wither, become more pleasantly scented? Is it

908 a γίνεται; πότερον ὅτι τῆς δυσωδίας αἴτιον ἀπεψια
 τις περιπτώματος; διὸ καὶ οἱ ἰδρώτες ἐνίοις καὶ
 ἐνίοτε τοιοῦτοί εἰσιν, μάλιστα δὲ οἷς μὴ αἰεὶ τοιοῦτοι
 ἐκ τῶν νόσων γίνονται. καὶ αἱ φύσαι δὲ καὶ οἱ
 ἐρυγμοὶ οἱ τῶν ἀπέπτων δυσώδεις εἰσὶ. τὸ αὐτὸ
 5 δὲ αἴτιον καὶ τοῦ ἐν ταῖς σαρκὶ καὶ τῷ ἀνάλογον.
 λέγω δὲ ἀνάλογον τὸ ἀντὶ σαρκὸς τοῖς ἄλλοις
 ἐνυπάρχον ζώοις. ἔστι γὰρ καὶ ἐνταῦθα περίττωμα
 ἐνίοις ἀπεπτον· τοῦτο οὖν ζώντων τε αἴτιον τῆς
 δυσωδίας ἐστὶ καὶ φθειρομένων σηπόμενον. διὸ
 καὶ τὰ πίονα καὶ ὀστά καὶ τρίχες οὐ δυσώδη ἐστίν,
 10 ὅτι τὰ μὲν πέττεται, τὰ δὲ οὐκ ἔχει ὑγρότητα.
 τοῖς δὲ φυτοῖς οὐκ ἔνι περίττωμα. ἢ ἔστι μὲν τι
 καὶ τούτοις, ἀλλ' ὅτι ξηρὰ καὶ θερμὰ τὰ φυτὰ τὴν
 φύσιν ἐστίν, ὥστε εὐπεπτοτέρα ἢ ἰκμὰς καὶ οὐ
 πηλώδης ἐστὶν αὐτῶν. δηλοῖ δὲ καὶ τῆς γῆς ἢ
 ἐν τοῖς θερμοῖς εὐώδης οὔσα, Συρία καὶ Ἀραβία,
 15 καὶ τὰ εὐώδη τὰ κεῖθεν, ὅτι ξηρὰ καὶ θερμὰ ἐστίν·
 τὰ δὲ τοιαῦτα ἀσηπτα. τὰ δὲ ζῶα οὐ τοιαῦτά
 ἐστὶ [καὶ θερμὰ],¹ ὥστε αἷ τε περιπτώσεις ἀπεπτοι
 καὶ δυσώδεις αὐτῶν εἰσὶν καὶ διαφυσήσεις ὁμοίως·
 καὶ διαφθειρομένων σήπεται ἢ ὑγρότης, τῶν δὲ οὐ·
 οὐ γὰρ ἔχουσιν.

20 Διὰ τί τὰ δυσώδη θερμὰ ὄντα μᾶλλον δυσώδη
 ἐστὶν ἢ ἐψυγμένα; ἢ ὅτι ἐστὶν ἢ ὀσμὴ ἀτμὸς καὶ
 ἀπορροή τις; ὅ τ' οὖν ἀτμὸς ὑπὸ θερμοῦ γίνεται,
 καὶ ἢ ἀπορροή· κίνησις γάρ τις ἐστίν, τὸ δὲ θερμὸν
 κινητικόν· τὸ δὲ ψυχρὸν τοῦναντίον στατικόν καὶ
 25 συσταλτικόν, καὶ φορὸν δὲ κάτω, τὸ δὲ θερμὸν καὶ

¹ Omitting [καὶ θερμὰ].

PROBLEMS, XIII. 4-5

because the cause of an unpleasant smell is the lack of concoction of waste product? So sweat in some cases and at some times is of this character, but especially with those with whom it is not always unpleasant, as the result of a disease. Also the breath and belching of those whose waste product is not concocted has an unpleasant smell. The same cause must explain the unpleasant odour in the flesh and whatever corresponds to it. (By corresponding I mean what exists in other animals in the place of flesh.) For there also in some cases there is unconcocted waste product. This then, when it putrefies, is the cause of unpleasant odour in living creatures and in decaying bodies. This is why fat and bones and hair do not smell unpleasant; because the fat and bones are concocted and the hair contains no moisture. But in plants there is no waste product. Or is there waste product in them too, but plants are naturally dry and warm, so that the moisture in them is easily concocted and does not form a clayey substance? The soil in warm climates, such as Syria and Arabia, which is sweet-smelling, proves this and the fact that the sweet-smelling plants from there are dry and hot; and such things do not rot. But animals are not like this, so that their waste products are not concocted and are evil-smelling, and so is their breath; when they decay, the moisture putrefies, but this does not happen with plants, for they have no waste product.

Why is it that things smell more unpleasant when 5 hot than when cooled? Is it because smell is vapour and an emanation? Now vapour is due to heat, and so is an emanation. For it is a form of movement, and heat causes movement; cold on the other hand is stationary and causes contraction and movement

908 a

αἱ ὄσμαι πᾶσαι ἀνωφερεῖς διὰ τὸ ἐν ἀέρι τε εἶναι
καὶ τὸ αἰσθητήριον αὐτῶν ἄνω εἶναι, μὴ κάτω·
πρὸς γὰρ ἐγκέφαλον περαίνουσα ἢ ὄσμη αἰσθησιν
ποιεῖ.

Διὰ τί, ἐάν τις σκόροδα φάγη, τὸ οὔρον ὄζει, β
ἄλλων δὲ ἐχόντων ἰσχυρὰν ὄσμήν οὐκ ὄζει ἐδεσθέν-
80 των; πότερον, ὥσπερ τινὲς τῶν ἠρακλειτιζόντων
φασίν, ὅτι ἀναθυμιᾶται, ὥσπερ ἐν τῷ ὄλῳ, καὶ ἐν
τῷ σώματι, εἶτα πάλιν ψυχθὲν συνίσταται ἐκεῖ
μὲν ὑγρόν, ἐνταῦθα δὲ οὔρον; ἢ ἐκ τῆς τροφῆς
ἀναθυμίασις, ἐξ οὗ ἐγένετο αὕτη συμμιγνυμένη,
ποιεῖ τὴν ὄσμήν· αὕτη γὰρ ἐστίν, ὅταν μετα-
85 βάλλῃ. ἢ ἔδει καὶ τὰ ἄλλα τοῦτο ποιεῖν, ὅσα
ἰσχυρὰς ὄσμας ἔχει· νῦν δὲ οὐ ποιεῖ. ἔτι συγ-
κρινόμενα ἐκ τῆς ἀτμίδος οὐκ εἰς τὸ ἀρχαῖον
ἔρχεται, οἶον οἶνος ἐξ οἴνου, ἀλλ' οὐχ ὕδωρ, ὥστε
908 b καὶ τοῦτο ψεῦδος. ἀλλ' ὅτι μόνον φυσητικὸν τῆς
κάτω κοιλίας τῶν ὄσμήν ἐχόντων ἰσχυρὰν ἅμα
καὶ οὔρητικὴν, τὰ δὲ ἄλλα ἄνω ποιεῖ, οἶον ἢ
ράφανος, [καὶ] τὰ πνεύματα. ἢ οὐκ οὔρητικά.
5 τούτῳ¹ δὲ τρία ὑπάρχει ταῦτα· καὶ γὰρ οὔρητικόν,
καὶ πνεῦμα ποιεῖ, καὶ τοῦτο κάτω. ὁ δὲ τόπος ὁ
πέριξ τὰ αἰδοῖα καὶ τὴν κύστιν τῶν τοιούτων
ἀπολαύει διὰ τὴν γειτνίασιν, καὶ ὅτι πνευματικός
ἐστίν· δηλοῖ δὲ ἢ συντονία τοῦ αἰδοίου. δῆλον
οὖν ὅτι ἀφικνεῖται τὸ περίπτωμα εἰς τὴν κύστιν
αὐτοῦ μάλιστα τῶν τοιούτων ἅμα τῷ πνεύματι,
10 ὁ μιγνύμενον ποιεῖ τοῦ οὔρου τὴν ὄσμήν.

Διὰ τί τὰ στόματα μηδὲν ἐδηδοκότων, ἀλλὰ 7

¹ τούτῳ Forster : κάτω Kuelle.

PROBLEMS, XIII. 5-7

downwards, but heat and all smells travel upwards, because they are in air and the sense which perceives them is above and not below; for a smell causes sensation when it penetrates to the brain.

Why is it that, if one eats garlic, the urine smells, 6 but when other strong-smelling things are eaten the urine does not smell of them? Is it because, as the Heracleitean School say, evaporation takes place in the body as it does in the universe, and then, when cooling follows, moisture forms in the universe and urine in the body? The evaporation from food causes a smell of that of which it is compounded; for the odour occurs when the change takes place. But in this case should not other strong-smelling substances produce this result? But in fact they do not. Moreover what is collected from evaporation does not resume its original state (for, if it did, wine should result from the evaporation of wine, and not water), so that this also is untrue. Actually of all substances which have a strong smell and also promote urine, garlic alone produces inflation of the lower stomach; all other such substances (for instance the radish) produce breath upwards, or else are not diuretic. But garlic has three qualities. It is diuretic, it produces breath and does so below. The region about the private parts and the bladder shows the effects of these foods because of its nearness, and because the region is inclined to contain breath; the tension of the private parts shows this. It is, therefore, clear that of all things the waste product of garlic is most likely to enter the bladder at the same time as the breath, and mingling with it impart its odour to the urine.

Why do the mouths of those who have eaten 7

908 b

νηστευσάντων ὄξει μᾶλλον (ὃ καλεῖται νηστείας ὄξει), φαγόντων δὲ οὐ, ὅτε ἔδει μᾶλλον; ἢ ὅτι κενουμένης τῆς κοιλίας θερμότερος ὁ ἀήρ γινόμενος
 15 διὰ τὴν ἀκίνησίαν σήπει τὸ πνεῦμα καὶ τὰ φλεγ-
 ματώδη περιττώματα; ὅτι δὲ θερμότερος γίνεται,
 σημεῖον ὅτι καὶ δίψαν ποιεῖ ἢ νηστεία μᾶλλον.
 φαγόντων δὲ διὰ τὸ ἐλάττων εἶναι ἢ ὁσμὴ τῆς τῶν
 σιτίων παύεται· κρατεῖ γὰρ τῆς θερμότητος ἢ τῶν
 σιτίων θερμότης, ὥστε μηθὲν πάσχειν.

20 Διὰ τί ἢ μασχάλη δυσωδέστατος τῶν τόπων; 8
 πότερον ὅτι ἀπνούστατός ἐστιν; ἔστι δὲ ἢ δυσωδία
 ἐν τοῖς τοιούτοις μάλιστα, διὰ τὸ σῆψιν γίνεσθαι
 ὑπὸ τῆς ἡσυχίας τῆς πιότητος· ἢ διότι ἀκίνητος
 καὶ ἀγύμναστος.

Διὰ τί οἱ τοῦ γράσου ὄζοντες, ὅταν ἀλείφονται 9
 25 μύρω, δυσωδέστεροι γίνονται; ἢ διότι τοῦτο ἐπὶ
 πολλῶν γίνεται, οἶον ὄξυ καὶ γλυκὺ συμμιχθὲν τὸ
 ὄλον γλυκύτερον ἐγένετο; εἶτα πάντες ἰδρώσαντες
 δυσωδέστεροί εἰσι, τὸ δὲ μύρον θερμαντικόν ἐστιν·
 ἰδρῶτας οὖν παρασκευάζει.

Διὰ τί τῶν ἐγκύρτων καὶ κυφοτέρων δυσσοσ- 10
 30 μοτέρα καὶ βαρυτέρα ἢ ὁσμὴ τοῦ πνεύματος; ἢ
 διότι συγκέκλεισται ὁ τόπος ὁ περὶ τὸν πνεύμονα
 καὶ ἀνέσπασται ἐκ τῆς εὐθυωρίας, ὥστε οὐκ
 εὔπνους, ἀλλὰ σήπεται ἢ ἰκμᾶς καὶ τὸ πνεῦμα
 μᾶλλον εἴσω ἐγκατακλειόμενον;

Διὰ τί τὰ πολλὰ τῶν μύρων συνεξιδρῶσαι 11
 85 δυσώδη, ἔνια δὲ ἡδίω ἢ οὐ χείρω; ἢ ὅσα μὲν τῇ
 κινήσει ἢ τρίψει μεταβάλλοντα, χείρω τοιαῦτα,

PROBLEMS, XIII. 7-11

nothing, but are fasting, smell more (this is called the smell of fasting), but the mouths of those who have eaten do not, though they rather should do so? Is it because, as the stomach becomes emptied, the air growing warmer, because it does not move, causes a decay of the breath and phlegmatic waste products? That it becomes hotter is proved by the fact that fasting produces thirst. But when men have eaten, because the smell is less than that of the food, it ceases; for the heat of the food masters its heat, so that no effect is produced.

Why is the armpit the most unpleasant-smelling 8 region? Is it because the least air reaches it? There is a most unpleasant smell in these parts because of the decay of fat, which takes place because it is at rest? Or is it because it has neither movement nor exercise?

Why do those who have a goat-smell, when they are 9 anointed with ointment, become more unpleasant? Is it due to what happens in many cases; for instance, when bitter and sweet are mixed, the whole becomes more sweet? So all men smell more unpleasant after sweating, but ointment produces heat; hence it causes sweat.

Why is the smell of the breath heavier and more 10 unpleasant in the deformed and stooping? Is it because the region about the lungs is contracted and distorted out of the straight, so that the breath is not free, but the moisture and the breath enclosed within are more liable to decay?

Why are most ointments combined with sweat 11 unpleasant to smell, but some more pleasant or at any rate not worse? Is it because all such things which change owing to movement or friction become

ARISTOTLE

908 b ὅσα δὲ μή, τούναντίον; ἔστι δὲ ἕνια τοιαῦτα,
 909 a ὥσπερ καὶ τῶν ἀνθῶν, ἐξ ὧν γίνονται αἱ εὐωδίαι,
 τὰ μὲν τριβόμενα ἢ θερμαινόμενα ἢ ξηραινόμενα
 φαῦλα, οἷον τὰ λευκῶια, τὰ δὲ ὅμοια, οἷον τὰ ῥόδα.
 καὶ τῶν μύρων δὴ ὅσα ἐκ τοιούτων ἐστί, μετα-
 βάλλει, τὰ δὲ οὐ· διὸ τὸ ῥόδιον ἠκιστα. καὶ
 5 δυσώδη δὲ φαίνεται μᾶλλον ὅσων οἱ ἰδρῶτες
 δυσώδεις, καὶ διὰ τὸ μίγνυσθαι τῷ ἐναντίῳ, ὥσπερ
 τὸ μέλι μετὰ τοῦ ἀλὸς οὐ μᾶλλον γλυκύ, ἀλλ'
 ἥττον.

Διὰ τί πάντα μᾶλλον ὄζει κινούμενα; ἢ διότι 12
 ἀναπίμπλησι τὸν ἀέρα; διαπέμπεται οὖν θᾶπτον
 10 ἢ ὁσμὴ πρὸς τὴν αἴσθησιν.

PROBLEMS, XIII. 11-12

worse, but those which do not do so show the contrary effect? There are some such things, just as there are some flowers from which pleasant scents arise, which when rubbed or heated or dried smell worse, such as white violets, and others again like roses which smell the same. Now ointments which are made from such plants change but others do not; least of all ointment made from roses. Also unguents seem to be more unpleasant on those whose sweat is unpleasant owing to their mixture with their opposite, just as honey mixed with salt is not more sweet but less.

Why do all things smell more when in motion? Is it because they infect the air? Hence the smell is more quickly transmitted to the senses.

ΙΑ

ΟΣΑ ΠΕΡΙ ΚΡΑΣΕΙΣ

909 a

Διὰ τί θηριώδεις τὰ ἔθνη καὶ τὰς ὄψεις οἱ ἐν ταῖς 1
 ὑπερβολαῖς ὄντες ἢ ψύχους ἢ καύματος; ἢ διὰ τὸ
 15 αὐτό; ἢ γὰρ ἀρίστη κράσις καὶ τῇ διανοίᾳ συμ-
 φέρει, αἱ δὲ ὑπερβολαὶ ἐξιστάσιν, καὶ ὥσπερ τὸ
 σῶμα διαστρέφουσιν, οὕτω καὶ τὴν τῆς διανοίας
 κράσιν.

Διὰ τί ἐν τῷ Πόντῳ ὁ σίτος ἔαθεις ἐν τῷ ψύχει 2
 πολλὰ ἔτη γίνεται ἄκοπος; ἢ ὅτι ἐξικμάζεται τὸ
 20 ἀλλότριον ὑγρὸν μετὰ τοῦ θερμοῦ, ὥσπερ ἐν ταῖς
 σταφυλαῖς; ἔνια μὲν γὰρ ὑπὸ τοῦ ψυχροῦ, ἔνια
 δὲ ἅμα τῷ θερμῷ.

Διὰ τί ἐν τῇ ψυχροτάτῃ ὥρα οἱ καῦσοι μᾶλλον 3
 γίνονται; ἢ διότι ἀντιπεριίστησι τὸ ψῦχος εἴσω
 τὴν θερμότητα; ἐν δὲ τῷ θέρει τοῦναντίον συμ-
 25 βαίνει, τὰ εἴσω ψυχρότερα. ὁ δὲ καῦσος πυρετὸς
 τῶν ἔξω κατεψυγμένων τὰ ἔσω θερμότητι ὑπερ-
 βάλλει.

Διὰ τί οἱ Αἰθίοπες καὶ οἱ Αἰγύπτιοι βλαιοὶ 4
 εἰσιν; ἢ διότι ὑπὸ θερμοῦ, ὥσπερ καὶ τὰ ξύλα

BOOK XIV

PROBLEMS CONNECTED WITH TEMPERAMENT

WHY are those who live in conditions of excessive 1 cold or heat beast-like both in habits and in appearance? Are both results due to the same cause? For the best mixture benefits the mind but excesses disturb it, and just as they cause distortion to the body, so do they also affect the mental temperament.

Why is it that in the Pontus corn which is left in 2 the cold remains intact for many years? Is it because the extraneous moisture is drawn off together with the heat, just as it is with grapes? For in some things the moisture is drawn off by cold, and in others at the same time as the heat.

Why do bilious fevers occur more often in the 3 coldest season? Is it because the cold retains the heat inside? But in the summer the opposite occurs, and the inside parts are colder. This bilious fever is due to the fact that the inside parts which are hot have more effect than the outside parts which are cold.^a

Why are Ethiopians and Egyptians bandy-legged? 4 Is it due to the heat, and just as planks are warped

^a This is not a correct translation of the Greek, which as it stands is untranslatable, but from the context this seems to be what the author means.

909 a διαστρέφεται ξηραίνόμενα, οὕτω καὶ τὰ τῶν ζώων
 30 σώματα; δηλοῦσι δὲ καὶ αἱ τρίχες· οὐλοτέρας
 γὰρ ἔχουσιν, ἢ δὲ οὐλότης ἐστὶν ὡσπερ βλαισότης
 τῶν τριχῶν.

Διὰ τί ἐν τοῖς νοτίοις μᾶλλον θηλυτοκοῦσιν αἱ 5
 ὀχεῖαι; ἢ ὅτι τὸ πλεῖον ὑγρὸν βραδύτερον παχύ-
 νεται; ἐν δὲ τοῖς νοτίοις διὰ τὴν ὑγρότητα τῆς
 κράσεως ὑγρότερον τὸ σπέρμα γίνεται.

35 Διὰ τί ἐν τοῖς ἐλώδεσι τὰ μὲν ἐν τῇ κεφαλῇ ἔλκη 6
 ταχὺ ὑγιάζεται, τὰ δὲ ἐν ταῖς κνήμαις μόλις; ἢ
 ὅτι βαρεῖα ἢ ὑγρότης διὰ τὸ γεώδης εἶναι, τὰ δὲ
 βαρέα εἰς τὸ κάτω ὑποχωρεῖ; τὰ μὲν οὖν ἄνω
 εὔπεπτα διὰ τὸ ὑποκεχωρηκέναι εἰς τὸ κάτω, τὰ
 40 δὲ κάτω πολλῆς γέμει τῆς περιττώσεως καὶ
 εὐσήπτου.

909 b Διὰ τί οἱ μὲν ἐν τοῖς εὐπνόοις τόποις βραδέως 7
 γηράσκουσιν, οἱ δὲ ἐν τοῖς κοίλοις καὶ ἐλώδεσι
 ταχέως; ἢ τὸ γῆρας σηπεδῶν τίς ἐστίν, σήπεται
 δὲ τὸ ἡρεμοῦν, τὸ δὲ ἐν κινήσει ὄν ἢ ὅλως ἀσαπὲς
 5 ἢ ἡττον τοῦτο πάσχει, οἷον τὸ ὕδωρ; ἐν μὲν οὖν
 τοῖς ὑψηλοῖς διὰ τὴν εὐπνοϊαν ὁ ἀῆρ ἐν κινήσει
 ἐστίν, ἐν δὲ τοῖς κοίλοις μένει. ἔτι δὲ ἐκεῖ μὲν διὰ
 τὴν κίνησιν αἰεὶ καθαρὸς ὁ ἀῆρ καὶ ἕτερος γίνεται,
 ἐν δὲ τοῖς ἐλώδεσι μένει.

Διὰ τί οἱ μὲν ἐν τοῖς θερμοῖς τόποις δειλοὶ εἰσιν, 8
 10 οἱ δὲ ἐν τοῖς ψυχροῖς ἀνδρεῖοι; ἢ ὅτι ἐναντίως τοῖς
 τόποις καὶ ταῖς ὥραις ἢ φύσις ἔχει, διὰ τὸ ὁμοίως
 ἐχόντων ἀνάγκη διακαίεσθαι ταχέως; ἀνδρεῖοι δὲ
 εἰσιν οἱ τὴν φύσιν θερμοί, δειλοὶ δὲ οἱ κατεψυγμένοι.
 συμβαίνει δὲ τοὺς μὲν ἐν τοῖς θερμοῖς ὄντας κατ-
 15 εψῦχθαι, τοὺς δὲ ἐν τοῖς ψυχροῖς ἐκτεθερμάνθαι

PROBLEMS, XIV. 4-8

when they dry, so are the bodies of living creatures? The hair proves this; for theirs is curlier, and curliness is a curving of the hair.

Why is it that in wet districts mating is more likely 5 to produce the female sex? Is it because the greater quantity of moisture thickens more slowly? In wet districts owing to the amount of moisture in the temperament the semen becomes moister.

Why is it that in marshy districts wounds on the 6 head heal easily, but those on the legs with difficulty? Is it because the moisture is heavy because of its earthy nature, and heavy things tend to fall? So the upper parts are easily concocted because the moisture sinks downwards, but the lower parts are full of waste products, which easily decompose.

Why do men grow old slowly in airy places, but 7 quickly in regions which are hollow and marshy? Is old age a form of decomposition and does that which is still decompose, but what is in motion is either not at all liable to decomposition or at any rate to a less degree, for example, water? So in high districts, because they are airy, the air is always in motion, but in hollow ones it remains still. Also in the former places the air is always pure and changing because of its movement, but in marshy districts it remains still.

Why are the dwellers in hot places cowardly, while 8 those who live in the cold countries are brave? Is it because nature works in just the opposite way to places and seasons, since if they operated in the same way men would of necessity be quickly destroyed by heat and cold. Those who are naturally hot are brave, while the chilled are cowardly. Now it comes about that those who live in a hot climate are chilled, but those who live in a cold climate have a hot nature.

909 b

τὴν φύσιν. μεγάλοι δὲ ἄμφω εἰσίν, οἱ μὲν ἐν τοῖς ψυχροῖς διὰ τὴν ἐν αὐτοῖς σύμφυτον θερμότητα, οἱ δ' ἐν τοῖς θερμοῖς διὰ τὴν ἐν τῷ τόπῳ· ἐν γὰρ τοῖς θερμοῖς καὶ ὑπὸ τοῦ θερμοῦ αὐξάνονται. τὸ δὲ ψῦχος πιλητικόν ἐστιν. ἅτε οὖν τῶν μὲν ἐν αὐτοῖς
 20 ἐχόντων τὴν ἀρχὴν τῆς αὐξήσεως σφοδράν, τῶν δὲ οὐ κωλυομένων ὑπὸ τῆς ἔξωθεν ψυχρότητος, εἰκότως ἐπὶ πολὺ τὴν αὐξήσιν ἐπιδέχονται. οἱ δὲ περὶ ἡμᾶς ἦττον διὰ τὸ ἐλάττω τε ἔχειν τὴν ἀρχὴν ἐν αὐτοῖς, καὶ διὰ τὸ τοὺς ἐν τοῖς ψυχροῖς συμπιλεῖσθαι.

25 Διὰ τί μακρόβιοι μᾶλλον εἰσιν οἱ ἐν τοῖς θερμοῖς 9 τόποις οἰκοῦντες; ἢ διὰ τὸ ξηροτέραν ἔχειν τὴν φύσιν, τὸ δὲ ξηρότερον ἀσαπέστερον εἶναι καὶ πολυχρονιώτερον, τὸν δὲ θάνατον οἷον σῆψίν τινα
 30 εἶναι; ἢ διότι ὁ μὲν θάνατός ἐστι ψύξις τοῦ ἐντὸς θερμοῦ, καταψύχεται δὲ πᾶν ὑπὸ τοῦ περιέχοντος καὶ ψυχροτέρου; ἔστιν δὲ ὁ περιέχων ἀήρ ἐν μὲν τοῖς ἀλεινοῖς τόποις θερμός, ἐν δὲ τοῖς ψυχροῖς ψυχρός, ὥστε θᾶπτον καὶ μᾶλλον φθείρει τὸ ἐν αὐτοῖς θερμόν.

Διὰ τί οἱ ἐν τοῖς θερμοῖς τόποις μακροβιώτεροι; 10
 35 ἢ ὅτι μᾶλλον τὸ θερμόν καὶ τὸ ὑγρὸν σώζουσιν; ὁ γὰρ θάνατος ἢ τούτων φθορά.

Διὰ τί ἐν τοῖς ἐλώδεσι τόποις ὑπνωδέστεροι 11
 γινόμεθα; ἢ διότι κατεψυγμένοι μᾶλλον ἐν αὐτοῖς
 ἐσμέν, ἢ δὲ κατάψυξις ἡσυχία τις οὔσα παρα-
 40 σκευάζει ὕπνον, ὁ δὲ ὕπνος ἐν τῷ ἡσυχάζειν παρα-
 γίνεται;

910 a Διὰ τί οἱ ἐν τοῖς πλοίοις εὐχροῖ, ἐπὶ ὕδατος. 12
 δαιτώμενοι, μᾶλλον τῶν ἐν τοῖς ἔλεσιν; ἢ ἡ ὥρα
 καὶ τὸ εὐπνοῦν αἴτιον; ὠχροὺς δὲ τὸ ὕδωρ ποιεῖ,

PROBLEMS, XIV. 8-12

Both classes are big, those in cold climates because of the innate heat existing in them, those in hot climates owing to the heat of the place ; for growth is due to hot climate and heat. But cold has a contracting effect. It is natural then that they should admit of considerable growth, the former class because they have within themselves the origin of growth in a marked degree, the latter because they are not prevented by the outside cold. This does not apply so much to those who live in our part of the world (*i.e.* in a temperate climate), because they have less source of heat in themselves, and because those who live in cold regions feel the contracting effect of the cold.

Why are those who live in a hot climate longer 9 lived ? Is it because their nature is drier, and the drier is less liable to decomposition, and so lasts longer, death being a kind of decomposition ? Or is it because death is a chilling of internal heat, and everything is chilled by the surrounding air which is colder ? But the surrounding air is hot in warm climates and cold in cold climates, so that it more quickly and effectively destroys the heat within them.

Why do those in hot climates live longer ? Is it 10 because they keep both their heat and their moisture better ? For death is the destruction of these.

Why are we more sleepy in marshy districts ? Is 11 it because we become more easily chilled there, and chilling, implying as it does lack of movement, produces sleep, and sleep occurs when we are at rest ?

Why have those on board ship good complexions, 12 living as they do on the water, more than those who live in the marshes ? Are the weather and the amount of air responsible ? For water makes men pale,

910^a ὅταν σήπηται, ὃ πάσχει δι' ἀκινήσιαν· διὸ ἐν τοῖς ἐλώδεσιν ὑπωχροί.

5 Διὰ τί ἐν τοῖς χειμερινοῖς χωρίοις πνίγη σφοδρὰ 13 γίνεται πολλά, καὶ μάλλον ἢ ἐν τοῖς ἀλεεινοῖς; πότερον διὰ τὴν ὑγρότητα τοῦ ἀέρος; ἀπὸ γὰρ τῆς αὐτῆς θερμότητος ὕδωρ θερμότερον γίνεται τοῦ ἀέρος, ὥστε καὶ ὁ ἀήρ <ὁ>¹ ὑγρότερος τοῦ ξηροῦ.²
10 ἢ οὐδὲ ἔστι θερμότερος³ ὁ ἀήρ ἐν τοῖς τόποις τοῖς τοιούτοις, ἀλλὰ φαίνεται παρὰ τὸ ἐναντίον, ὥσπερ ὁ ἐκ νεφέλης ἥλιος παρὰ τὸ ἐκ τῆς σκιᾶς θερμαίνεσθαι.

Διὰ τί οἱ πρὸς μεσημβρίαν οἰκοῦντες μάλλον εἰσι 14 μελανόφθαλμοι; ἢ γλαυκὰ μὲν ἔστι τὰ ὄμματα δι' ὑπερβολὴν τοῦ ἐντὸς θερμοῦ, μέλανα δὲ διὰ τὴν 15 τούτου ἀπουσίαν, ὥσπερ καὶ Ἐμπεδοκλῆς φησιν; καθάπερ οὖν τῶν πρὸς ἄρκτον οἰκούντων γλαυκὰ <τὰ> ὄμματά ἐστι τῷ τὸ ἐντὸς θερμὸν κωλύεσθαι 20 διεκπίπτειν διὰ τὸ ἐκτὸς ψυχρόν, οὕτω τῶν πρὸς μεσημβρίαν οἰκούντων τὸ μὲν ὑγρὸν διὰ τὸ περιέχον θερμὸν οὐκ ἐκπίπτει, τὸ δὲ θερμὸν μηδενὸς ἀντιφράττοντος ἐκπίπτει, τὸ δὲ λειπόμενον ὑγρὸν μέλαν ποιεῖ· τῇ γὰρ τοῦ φωτὸς ἀπουσίᾳ τὸ λειπόμενόν ἐστι σκοτῶδες. ἢ τοῖς τοῦ λοιποῦ σώματος χρώμασιν ὁμοιοῦται τὸ ἐν τῷ ὀφθαλμῷ χρῶμα; διὸ τῶν πρὸς ἄρκτον λευκῶν ὄντων γλαυκὰ τὰ ὄμματα (τοῦ γὰρ λευκοῦ τοῦτο ἐγγὺς τὸ χρῶμα), 25 καὶ τῶν πρὸς μεσημβρίαν μελάνων ὄντων μέλανα καὶ τὰ ὄμματα.

Διὰ τί οἱ ἐν τοῖς θερμοῖς τόποις σοφώτεροί εἰσι 15 ἢ ἐν τοῖς ψυχροῖς; πότερον διὰ τὸ αὐτὸ δι' ὅπερ καὶ οἱ γέροντες τῶν νέων; οἱ μὲν γὰρ διὰ τὴν ψυχρότητα τοῦ τόπου ἐπανιούσης τῆς φύσεως

PROBLEMS, XIV. 12-15

when it decomposes, which is the result of its lack of movement ; so men grow pale in marshy districts.

Why is suffocating heat common in wintry places, 13 even more than in hot places ? Is it due to the dampness of the air ? For owing to the same heat the water grows hotter than the air, so that the damper air becomes hotter than the dry air. Or else the air is not hotter in such places, but only seems so by contrast, just as the sun coming from behind a cloud seems hotter by contrast with its effect behind a cloud.

Why do those who live in the south tend to have 14 dark eyes ? Are eyes grey because of the excess of internal heat, and dark because of the absence of this, as Empedocles says ? So just as those who live in the north have grey eyes because the internal heat is prevented from escaping by the external cold, so with those who live in the south the moisture does not escape owing to the surrounding heat, but the heat escapes because there is nothing to obstruct it, and the moisture remaining behind causes the dark colour ; for what is left behind becomes dark owing to the absence of light. Or does the colour of the eye conform to the colour of the rest of the body ? Hence, as those who live in the north are fair, their eyes are grey (for this colour approximates to fair), and as those who live in the south are dark, their eyes are also dark.

Why are those who live in hot climates wiser than 15 those who live in cold ? Is it for the same reason that makes the old wiser than the young ? For those who live in cold climates are much hotter because their

¹ <ὁ> added by Ross.

² ξηροῦ Ross : θερμοῦ Ruelle.

³ θερμότερος Ross : ξηρότερος Ruelle.

910^a
 30 αὐτῶν θερμότεροί εἰσι πολὺ, ὥστε λίαν μεθύουσιν
 εἰκόασιν, καὶ οὐκ εἰσὶ ζητητικοί, ἀλλὰ ἀνδρείοι καὶ
 εὐέλπιδες· οἱ δὲ ἐν τοῖς ἀλεεινοῖς νήφουσι διὰ τὸ
 κατεψῦχθαι. πανταχοῦ δὲ οἱ φοβούμενοι τῶν θαρ-
 ρούντων μᾶλλον ἐπιχειροῦσι ζητεῖν, ὥστε καὶ
 35 εὐρίσκουσι μᾶλλον. ἢ διὰ τὸ πολυχρονιώτερον τὸ
 γένος εἶναι τοῦτο, τοὺς δὲ ὑπὸ τοῦ κατακλυσμοῦ
 ἀπολέσθαι, ὥστε εἶναι καθάπερ νέους πρὸς γέροντας
 τοὺς ἐν τοῖς ψυχροῖς τόποις πρὸς τοὺς ἐν τοῖς
 θερμοῖς οἰκοῦντας;

Διὰ τί οἱ μὲν ἐν τοῖς θερμοῖς τόποις δειλοὶ εἰσιν, 16
 οἱ δὲ ἐν τοῖς ψυχροῖς ἀνδρείοι; ἢ ὅτι ἐναντίως τοῖς
 910^b τόποις καὶ ταῖς ὥραις ἢ φύσιν ἔχει, διὰ τὸ ὁμοίως
 ἐχόντων διακαίεσθαι¹ ἂν ταχέως; ἀνδρείοι δὲ εἰσιν
 οἱ τὴν φύσιν θερμοί, δειλοὶ δὲ οἱ κατεψυγμένοι.
 συμβαίνει δὴ τοὺς μὲν ἐν τοῖς θερμοῖς ὄντας κατα-
 5 ψύχεσθαι (ἀραιοῦ γὰρ ὄντος αὐτοῖς τοῦ σώματος τὸ
 θερμὸν αὐτῶν ἔξω διεκπίπτει), τοὺς δ' ἐν τοῖς
 ψυχροῖς ἐκτεθερμάνθαι τὴν φύσιν διὰ τὸ ἐκ τοῦ
 ἐκτὸς ψύχους πυκνοῦσθαι τὴν σάρκα, πυκνουμένης
 δὲ ἐντὸς συστέλλεσθαι τὸ θερμόν.

¹ The ms. has διακναίεσθαι here, but διακαίεσθαι in the same phrase in Problem 8.

PROBLEMS, XIV. 15-16

nature resists owing to the coldness of the region, so that they are very like men who are drunk, and are not inquisitive, but courageous and sanguine; but those who live in warm climates are sober because they are cooled. For everywhere the fearful are more inclined to research than the confident, so that they discover more. Or is it because the race has lasted longer, while the others perished in the Flood, so that the relationship between the young and the old is exactly the same as that between those who live in cold places and those who live in hot?

Why are those who live in hot climates cowardly, 16 but those who live in cold climates brave? Is it because Nature works in the opposite way to places and the seasons, because if they had the same tendency they would quickly be destroyed by heat or cold? Those who are naturally hot are brave, and those who are chilled are cowardly. Now those who live in hot climates are chilled (for as their bodies are rare the heat escapes to the outside), but those who live in cold climates are naturally hot because the flesh is thickened by the outside cold, and when it has grown thick the heat is collected within.

ΙΕ

910^b ΟΣΑ ΜΑΘΗΜΑΤΙΚΗΣ ΜΕΤΕΧΕΙ ΘΕΩΡΙΑΣ
10

Διὰ τί διάμετρος καλεῖται μόνη τῶν δίχα δι-1
αιρουσῶν τὰ εὐθύγραμμα ἢ ἐκ γωνίας εἰς γωνίαν
ἀχθεῖσα γραμμὴ; ἢ ὅτι διάμετρος δίχα διαιρεῖ,
καθάπερ τοῦνομα ὑποσημαίνει, οὐ φθείρουσα τὸ
15 μετρούμενον; ἢ μὲν οὖν κατὰ τὰς συνθέσεις
διαροῦσα (λέγω δὲ τὰς γωνίας) διάμετρος ἔσται·
οὐ γὰρ φθείρει, ἀλλὰ διαιρεῖ, καθάπερ οἱ τὰ στρα-
τιωτικὰ σκεύη διαροῦντες. ἢ δὲ κατὰ τὰς γραμμὰς
σύνθετα τέμνουσα φθείρει· σύγκειται γὰρ τὸ εὐθύ-
γραμμον κατὰ τὰς γωνίας.

Διὰ τί διάμετρος καλεῖται; ἢ ὅτι δίχα μόνη 2
20 διαιρεῖ; ὥσπερ οὖν εἴ τις εἴποι διχάμετρός ἐστιν.
καὶ διὰ τί¹ μόνη τῶν δίχα τοῦτο καλεῖται; ἢ ὅτι
κατὰ μέλη ἢ κέκαμπται μόνη διαιρεῖ, αἱ δὲ ἄλλαι
κατὰ πλευράς;

Διὰ τί πάντες ἄνθρωποι, καὶ βάρβαροι καὶ 3
Ἕλληνες, εἰς τὰ δέκα καταριθμοῦσι, καὶ οὐκ εἰς
25 ἄλλον ἀριθμόν, οἷον β', γ', δ', ε', εἶτα πάλιν ἐπ-
αναδιπλοῦσιν, ἐν πέντε, δύο πέντε, ὥσπερ ἑνδεκα,

¹ διὰ τί Bekker : διότι Ruelle.

BOOK XV

PROBLEMS CONNECTED WITH MATHEMATICAL THEORY

WHY is it that of all the possible lines dividing a 1 rectangle into two parts only that drawn from one angle to another is called the diagonal? Is it because the diagonal divides the figure into two parts, as its name implies, but does not destroy its symmetry? On these grounds that line drawn from the junctions (by this I mean the angles) will be a diagonal; for it does not destroy it but divides it, like those who divide up arms of war. But any line drawn from one side to another destroys the figure; for a rectangle is constructed from its angles.

Why is the diagonal so called? Is it because it 2 alone divides the rectangle into two parts? It is as if one were to call it a dichameter. And why is this alone of all the lines dividing the rectangle known by this name? Is it because it alone divides the figure at the joints where they bend, whereas the others divide it in the sides?

Why do all men, both foreign and Greek, count in 3 tens, and not in any other numbers? For instance, they might count 2, 3, 4, 5, and then repeat one five, two five and so on as now they say eleven,^a twelve and

^a The literal translation of the Greek for eleven is one-ten.

910 b δώδεκα; οὐδ' αὖ ἐξωτέρω παυσάμενοι τῶν δέκα,
 εἶτα ἐκείθεν ἐπαναδιπλοῦσιν; ἔστι μὲν γὰρ ἕκαστος
 τῶν ἀριθμῶν ὁ ἔμπροσθεν καὶ ἐν ἡ δύο, καὶ οὕτως
 ἄλλος τις, ἀριθμοῦσι δ' ὅμως ὀρίσαντες ἄχρι τῶν
 80 δέκα. οὐ γὰρ δὴ ἀπὸ τύχης γε αὐτὸ ποιοῦντες
 φαίνονται καὶ αἰεὶ· τὸ δὲ αἰεὶ καὶ ἐπὶ πάντων οὐκ
 ἀπὸ τύχης, ἀλλὰ φυσικόν. πότερον ὅτι τὰ δέκα
 τέλειος ἀριθμός; ἔχων γὰρ πάντα τὰ τοῦ ἀριθμοῦ
 εἶδη, ἄρτιον περιττόν, τετράγωνον κύβον, μῆκος
 ἐπίπεδον, πρῶτον σύνθετον. ἢ ὅτι ἀρχὴ ἡ δεκάς;
 85 ἐν γὰρ καὶ δύο καὶ τρία καὶ τέτταρα γίνεται δεκάς.
 ἢ ὅτι τὰ φερόμενα σώματα ἐννέα; ἢ ὅτι ἐν δέκα
 ἀναλογίαις τέτταρες κυβικοὶ ἀριθμοὶ ἀποτελοῦνται;
 ἐξ ὧν φασὶν ἀριθμῶν οἱ Πυθαγόρειοι τὸ πᾶν συν-
 εστάναι; ἢ ὅτι πάντες ὑπῆρξαν ἄνθρωποι ἔχοντες
 δέκα δακτύλους; οἷον οὖν ψήφους ἔχοντες τοῦ
 911 a οἰκείου ἀριθμοῦ, τούτῳ τῷ πλήθει καὶ τὰ ἄλλα
 ἀριθμοῦσιν. μόνοι δὲ ἀριθμοῦσι τῶν Θρακῶν γένος
 τι εἰς τέτταρα, διὰ τὸ ὥσπερ τὰ παιδιά μὴ δύνασθαι
 μνημονεύειν ἐπὶ πολὺ, μηδὲ χρήσιν μηδενὸς εἶναι
 πολλοῦ αὐτοῖς.

5 "Ὅτι ἡ γῆ κέντρον· αἰεὶ γὰρ ὅμοια τὰ φαινόμενα 4
 ἡμῖν σχήματα. <οὐ>¹ δοκεῖ τοῦτο εἶναι, εἰ μὴ ἀπὸ
 τοῦ μέσου τις θεωρῆ, ἀλλ' ὅτε μὲν τρίγωνα, ὅτε δὲ
 τραπέζια, ὅτε δὲ ἄλλοῖα <ἄν> ἐδόκει, ἢ <δὲ>² γῆ
 μέσον ἡμῖν, εἰ ἀπὸ τούτων ἐνὶ ἡμᾶς θεωρεῖν. οὕσης

¹ <οὐ> added by Bussemaker.

<ἄν> and <δὲ> added by Forster.

^a i.e. a geometrical progression beginning 1, 2, 4, achieves four cubes in ten terms, viz. 1, 8, 64, 512.

^b Counters or pebbles were regularly used by the Greeks in counting. The suggestion that the ten fingers were responsible is supported by the Greek word πεμπάζειν which means "to count on the five fingers of one hand."

^c It is interesting to note that the Greeks, though regard-

PROBLEMS, XV. 3-4

so on. Or why do they not stop at a number beyond ten and repeat from there? For each number is made by putting a preceding number and one, two and so on with another number before them, and hence another number is formed, but they always count from ten as a limit. For as this is invariably done it clearly cannot be due to chance; for what is invariable and occurs in every case cannot be a chance arrangement but must be due to nature. Is it because ten is a perfect number? For it contains within itself every kind of number, even odd, square cube, length surface, prime number and multiple. Is this because ten is the origin? For 1 plus 2 plus 3 plus 4 makes ten. Or is it because there are nine travelling (heavenly) bodies? Or is it because in ten ratios four perfect cubes occur^a from which numbers the Pythagoreans say that the universe is constituted? Or is it because all men have ten fingers?^b Having then counters of a natural number, they number all other quantities by this number. The Thracians are the only race who count in fours, because like children they cannot remember very far, nor have they any use for any large number.^c

^d(Why do the shapes of the heavenly bodies always appear the same to us? Is it) because the earth is the centre? For the shapes which appear to us are always the same. This does not seem to be so if one does not look at them from the centre, but sometimes they would appear triangular and sometimes trapezoid, and sometimes would adopt other shapes, and the earth would appear a centre if it were possible for us to look at it from these other view-points.

ing the number ten as a natural base, never discovered the advantages of the Arabic system of decimal notation.

^a The statement of the problem is not included in the Greek text, nor in Th. G.'s translation, but is derived from another translation.

911 8 γὰρ σφαιροειδοῦς τῆς γῆς ταῦτό κέντρον τούτου καὶ
 10 τῆς γῆς ἔσται. ἡμεῖς δὲ ἐπάνω τῆς γῆς οἰκοῦμεν,
 ὥστε οὐκ ἀπὸ τούτου, ἀλλὰ τὸ ἥμισυ τῆς διαμέτρου
 ἀφεστῶσιν ἡμῖν τοιαῦτα φαίνεται. τί οὖν κωλύει
 πλέονος γινομένου τοῦ διαστήματος διαμένειν τὴν
 τῶν σχημάτων φαντασίαν;

Διὰ τί, τοῦ ἡλίου ὁμοτόνως φερομένου ἐν τῷ ἴσῳ 5
 15 χρόνῳ, οὐχ ἢ αὐτὴ αὔξεις καὶ φθίσεις τῶν σκιῶν;
 ἢ ὅτι ἴσαι γίνονται αἱ γωνίαι πρὸς τὰ ὀρώμενα, αἱ
 ἀπὸ τῶν ἀκτίνων ὑπὸ ταῖς ἴσαις περιφερείαις; εἰ δ'
 αὐταὶ καὶ $\langle \acute{\alpha}\varsigma \rangle$ ¹ ἐμβαλλόμεναι ποιοῦσιν ἀκτῖνες ἐν
 τῷ τριγώνῳ, ὅπερ ἔχεται ὑπὸ τε τῆς πρώτης ἀκ-
 τίνος καὶ τοῦ ὀρωμένου καὶ τῆς σκιᾶς. * * * εἰ δ'
 20 αἱ γωνίαι ἴσαι, ἀνάγκη τὴν πορρωτέρω γραμμὴν
 τοῦ ὀρωμένου μείζω εἶναι τῆς ἐγγυτέρω· τοῦτο γὰρ
 ἴσμεν. διηρήσθω οὖν ἡ περιφέρεια εἰς ἴσα ὅσα οὖν
 πλήθει, ὀράσθω δὲ τὸ Θ. ὅταν οὖν ὁ ἥλιος ἐπὶ
 τοῦ Α προσλαβὼν τὸ Θ ποιήσῃ τινὰ σκιὰν ἐν τῷ
 ΘΛ,² ἀνάγκη δὴ τὴν ἀκτῖνα ἐπὶ τὸ Λ² πίπτειν.
 25 ὅταν δ' ἔλθῃ ἐπὶ τὸ Β, ἢ ἀπὸ τοῦ Β ἀκτὶς ἐντὸς
 τῆς ΘΛ² πεσεῖται, καὶ ὅταν πάλιν ἐπὶ τὸ Γ μεταβῇ,
 ὡσαύτως· εἰ δὲ μή, εὐθεία εὐθείας διχῆ ἄψεται.

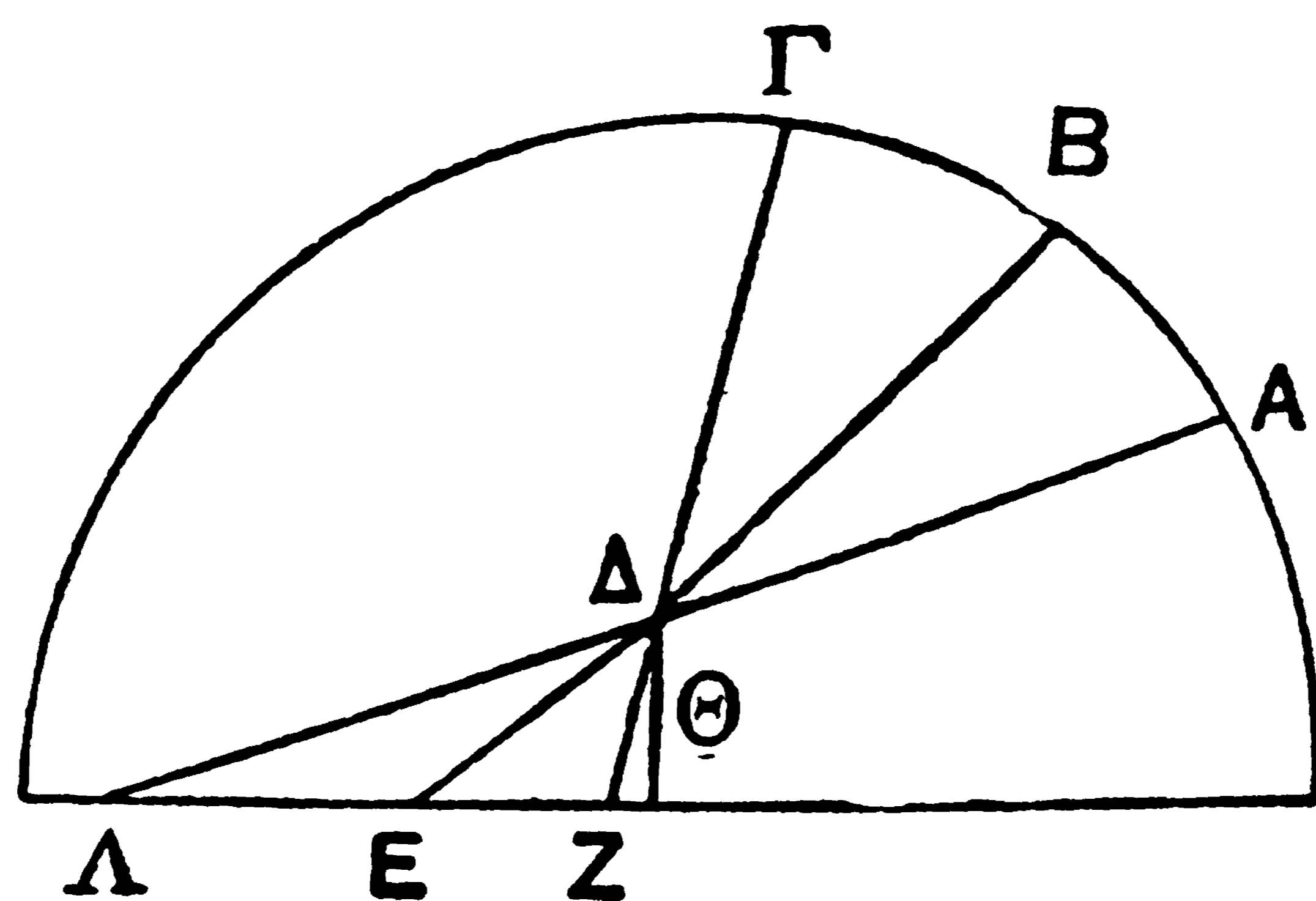
¹ $\langle \acute{\alpha}\varsigma \rangle$ added by Forster from Th. G.

² In each case Bussemaker's correction of Λ for Α has been adopted in the text.

PROBLEMS, XV. 4-5

Now as the earth is spherical the centre of the universe and of the earth will be the same. But we live above the earth, so that it is not from the centre but at a distance of half the diameter that the heavenly bodies appear to us as they do. What, then, is there to prevent the appearance of the shapes remaining the same when the distance is increased?

Why is it that although the sun travels at a regular pace the increase and decline of the shadows are not the same in an equal period of time? Is it because the angles made with the objects seen are equal, these being angles made by equal arcs? If these



are equal so also are those which the rays when they fall make in the triangle, contained by the first ray, the object seen and the shadow. If the angles are equal the farther line caused by the object seen must be greater than the nearer; this we know. Let the circumference be divided into any number of equal parts ($AB\Gamma$); let the object be called Θ . When the sun from the position A strikes the object and makes a shadow $\Theta\Lambda$ the ray must fall at Λ . But when it gets to B , the ray from B will fall within $\Theta\Lambda$, and similarly, when the sun reaches Γ ; otherwise one straight line will touch another at two points (which is impossible). Since then AB is equal

911^a ἐπεὶ οὖν ἴση ἢ AB τῇ $BΓ$, καὶ αἱ γωνίαι αἱ ὑπὸ
 ταύταις¹ αἱ πρὸς τῷ Δ ἴσαι ἔσονται· πρὸς τῷ κέντρῳ
 30 γάρ. εἰ δὲ τῇ τοῦ Δ , καὶ ἐν τῷ τριγώνῳ· κατὰ
 κορυφὴν γὰρ ταύταις. ὥστ' ἐπεὶ εἰς ἴσα διαιρεῖται
 ἡ γωνία, μείζων ἔσται ἢ $\Lambda^2 E$ τῆς EZ ἐν τῇ
 $\Lambda^2 \Theta$. ὁμοίως δὲ καὶ αἱ ἄλλαι ἄς ποιούσιν αἱ ἀπὸ
 τῆς περιφερείας ἀκτῖνες. ἅμα δὲ δῆλον καὶ ὅτι
 κατὰ μεσημβρίαν ἐλαχίστην ἀναγκαῖον εἶναι τὴν
 35 σκιάν, καὶ ὅτι αἱ ἐπιδόσεις τότε ἐλάχισται. μά-
 λιστα γὰρ καθ' ἡμᾶς ὁ ἥλιος τῆς μεσημβρίας ἐστίν,
 καὶ πνίγος γίνεται διὰ τε τὴν εἰρημένην αἰτίαν καὶ
 ὅτι ἀπνεύματος· ὅταν γὰρ διακρίνη τὸν πρὸς τῇ γῆ
 ἀέρα, πνεῦμα γίνεται. εἰ οὖν ἅμα ἐν ἀμφοτέροις
 911^b τοῖς ἡμισφαιρίοις, εἰκότως ἂν αἱ μέσαι νύκτες καὶ
 ἡ μεσημβρία ἀπνεύματοι εἶεν.

Διὰ τί ὁ ἥλιος διὰ τῶν τετραπλεύρων διέχων οὐκ ἔ
 εὐθύγραμμα ποιεῖ τὰ σχήματα, ἀλλὰ κύκλους, οἷον
 5 ἐν ταῖς ῥύψεσιν; ἢ ὅτι ἢ τῶν ὄψεων ἔκπτωσις
 κῶνός ἐστιν, τοῦ δὲ κώνου κύκλος ἢ βάσις, ὥστε
 πρὸς ὃ ἂν προσπίπτωσιν αἱ τοῦ ἡλίου ἀκτῖνες,
 κυκλοτερεῖς φαίνονται; ἀναγκαῖον μὲν γὰρ ἐστὶ
 καὶ τὸ ὑπὸ τοῦ ἡλίου σχῆμα ὑπ' εὐθειῶν περι-
 ἔχεσθαι, εἴπερ αἱ ἀκτῖνες εὐθεῖαι. ὅταν γὰρ εὐθεῖαι
 10 πρὸς εὐθείαν προσπίπτωσιν, εὐθύγραμμον ποιούσιν.
 ἐπὶ δὲ τῶν ἀκτίνων συμβαίνει τοῦτο· πρὸς εὐθείαν
 γὰρ προσπίπτουσι τὴν τοῦ ῥίπὸς γραμμὴν, ἢ δια-
 λάμπουσι, καὶ αὗται εὐθεῖαί εἰσιν, ὥστε πρὸς εὐ-
 θεῖαν ἔσται ἢ ἔκπτωσις. ἀλλὰ διὰ τὸ ἀσθενεῖς

¹ ταύταις Forster : ταύτης Ruelle.

² Bussemaker's correction Λ for Δ has been adopted in the text.

to $B\Gamma$, the angles subtended by these arcs at the point Δ will also be equal; for they are at the centre. But if the angles on one side of Δ are equal, so will those in the triangle be equal; for they are the angles at the vertices.^a So that since the angle is divided into equal parts, ΛE will be greater than EZ in the line $\Lambda\Theta$. And the same thing will be true of the other lines which the rays from the circumference make. It is, at the same time, clear that at midday the shadow must be shortest, and that at that time additions to it are least. For the sun is most overhead at midday, and the suffocating heat is due to the above reason and also because there is less air; for a breeze comes when the sun disperses the air near the ground. If, then, it does this at the same time in both hemispheres, naturally midnight and midday would be most airless.

Why is it that when the sun passes through quadri- 6
laterals, as for instance in wickerwork, it does not produce figures rectangular in shape but circular? Is it because the projection of the vision is in the form of a cone and the base of a cone is a circle, so that no matter what object they fall upon the rays of the sun must appear circular? For if the rays are straight the figure formed by the sun is necessarily bounded by straight lines. For when the rays fall straight on to a straight line they do produce a rectilinear figure. Now this is what happens with the rays; for they fall on the straight line of the wickerwork at the point where they shine through, and these are straight lines, so that they fall as a straight line. But because those parts of the vision

^a "Vertically opposite" in the language of modern geometry.

911 b εἶναι τὰς ἀποσχιζομένας ἀπὸ τῶν ὄψεων πρὸς τὰ
 15 ἄκρα τῶν εὐθειῶν, οὐχ ὁράται τὰ ἐν ταῖς γωνίαις·
 ἀλλ' ὅσον μὲν τῆς εὐθείας ἐνυπάρχει ἐν τῷ κώνῳ,
 ποιεῖ αὐτήν, τὸ δὲ λοιπὸν οὐ ποιεῖ, ἀλλὰ λανθά-
 νουσιν αἱ ὄψεις ἐπιπίπτουσαι. πολλὰ γὰρ οὐχ
 ὁρῶμεν ἐφ' ἃ δικνεῖται ἡ ὄψις, οἷον τὰ ἐν τῷ
 σκότει. ὅμοιον δὲ τούτῳ καὶ τὸ τὸ τετράγωνον
 20 πολυγωνοειδὲς φαίνεσθαι, εἴαν δὲ πλεόν ἀφιστῆ,
 κύκλον. ὄντος γὰρ κώνου τῆς τῶν ὄψεων ἐκ-
 πτώσεως, ἀφισταμένου τοῦ σχήματος εἰς τὸ πόρρω
 αἱ μὲν εἰς τὰς γωνίας ἀποσχιζόμεναι τῶν ὄψεων διὰ
 τὸ ἀσθενεῖς εἶναι καὶ ὀλίγαι οὐχ ὁρῶσι, πλείονος τοῦ
 ἀποστήματος γινομένου, αἱ δὲ εἰς τὸ μέσον προσ-
 25 πίπτουσαι, ἀθρόαι καὶ ἰσχυραὶ οὔσαι, διαμένουσιν.
 ἐγγὺς μὲν οὖν ὄντος τοῦ σχήματος δύναται καὶ τὰ
 ἐν ταῖς γωνίαις ὁρᾶν, πλείονος δὲ αὐτοῦ¹ γενομένου
 ἀδυνατοῦσιν. διὸ καὶ ἡ περιφερὴς ἀπαγομένη
 εὐθεῖα φαίνεται. καὶ ἡ σελήνη ὑπὸ εὐθειῶν περι-
 ἔχεσθαι δοκεῖ τῇ ὀγδόῃ, εἴαν μὴ κατὰ τὸ πλάτος,
 30 ἀλλὰ κατὰ τὴν περιέχουσαν γραμμὴν αἱ ὄψεις
 προσπίπτωσιν. ἐγγὺς μὲν γὰρ οὔσης τῆς περι-
 φερείας δύνανται διακρίνειν αἱ ὄψεις ὅσω ἐγγύτερόν
 ἐστι θάτερον θατέρου μέρους τῆς περιφερείας·
 πόρρω δὲ γινομένης οὐ διαισθάνεται, ἀλλὰ δοκεῖ
 αὐτῇ ἐξ ἴσου εἶναι. διὸ καὶ εὐθεῖα φαίνεται.
 35 Διὰ τί τῆς σελήνης σφαιροειδοῦς οὔσης εὐθεῖαν⁷
 ὁρῶμεν, ὅταν ἢ διχότομος; ἢ ὅτι ἐν τῷ αὐτῷ
 ἐπιπέδῳ ἢ ὄψις γίνεται καὶ ἡ τοῦ κύκλου περιφέρεια,
 ἣν ὁ ἥλιος ποιεῖ προσβάλλων τῇ σελήνῃ; ὅτε δὲ
 912 a τοῦτο γένοιτο, εὐθεῖα γραμμὴ ἐφαίνετο ὁ ἥλιος.
 ἐπεὶ γὰρ ἀνάγκη τὸ προσβάλλον τὰς ὄψεις πρὸς τὴν
 σφαῖραν κύκλον ὁρᾶν, ἢ δὲ σελήνη σφαιροειδής, καὶ

PROBLEMS, XV. 6-7

which are cut off at the extremities of the straight lines are weak, the parts at the angles are not visible; but all that is straight in the cone produces a line, but the rest produces no line, but the sight falls on it without our noticing. For there are many things to which the sight penetrates which we do not see, such as things in darkness. Similar to this is the phenomenon that a quadrilateral figure appears to have sundry angles, but if we stand farther off it looks like a circle. For as the projection of the sight is in the form of a cone, when the figure is removed to a distance, the parts of the visions which are at the angles are cut off and do not see anything because they are weak and few, when the distance grows greater, but those that fall on the centre persist because they are collected together and are strong. When the figure is near they can see also the parts at the angles, but when the distance becomes greater they cannot. So the circumference when carried to a distance appears straight. So also the moon seems to be bounded by straight lines on the eighth day, if the rays do not fall on its breadth, but on the line which encloses it. For, when the circumference is near, the eye can distinguish how much closer one part of it is than the other; but when it is at a distance it cannot distinguish, but it seems all alike. So it appears to be straight.

Why do we see the moon straight when it is half ⁷ full, although it is spherical? Is it because our vision and the circumference of the circle, which the sun causes when it falls on the moon, are in the same plane? Whenever this happens, the sun appears to be a straight line. For since that which casts its vision on a sphere must see a circle, and the moon is spherical

¹ πλείονος δ' αὐτοῦ Ross : πλείον δὲ αὐτῶν Ruelle.

⁹¹²^a ὁ ἥλιος ὁρᾷ αὐτήν, κύκλος ἂν εἴη ὁ ὑπὸ τοῦ ἡλίου
 γινόμενος. οὗτος οὖν ὅταν μὲν ἐξ ἐναντίας ἡμῖν
 5 γένηται, ὅλος φαίνεται καὶ δοκεῖ πανσέληνος εἶναι.
 ὅταν δὲ παραλλάττη διὰ τὴν τοῦ ἡλίου μετάβασιν,
 ἢ περιφέρεια αὐτοῦ κατὰ τὴν ὄψιν γίνεται, ὥστε
 εὐθεία φαίνεται. τὸ δὲ ἕτερον μέρος περιφερές, ὅτι
 ἐξ ἐναντίας κείται τῇ ὄψει ἡμισφαίριον. τὸ δὲ
 τοιοῦτο ἐφαίμετο ἡμικύκλιον. αἰεὶ γὰρ ἡ σελήνη
 10 κατ' ἀντικρὺ ἐστὶν τῆς ὄψεως. ἀλλ' ὅταν ὁ ἥλιος
 ἐπιβάλλῃ, οὐχ ὁρῶμεν, καὶ ἀναπληροῦται μετὰ τὴν
 ὀγδόην ἐκ τοῦ μέσου, ὅτι ἐπιπαρεξιὼν ὁ ἥλιος
 ἐκκλινέστερον ἡμῖν ποιεῖ τὸν κύκλον. οὕτω δὲ
 τιθέμενος πρὸς τὴν ὄψιν ὁ κύκλος κώνου τομῇ
 ἐμφερῆς ἐγένετο. μηνοειδῆς δὲ φαίνεται, ὅταν ὁ
 15 ἥλιος μεταβῇ. ὅταν γὰρ κατὰ τὰ ἔσχατα σημεία,
 καθ' ἃ διχότομος φαίνεται, ὁ κύκλος ὁ τοῦ ἡλίου
 γένηται, περιφέρεια φαίνεται ἢ τοῦ κύκλου. οὐ γὰρ
 ἔτι κατ' εὐθείαν ἐστὶ τῇ ὄψει, ἀλλὰ παραλλάττει.
 τούτου δὲ γινομένου, καὶ διὰ τῶν αὐτῶν σημείων
 τοῦ κύκλου ὄντος, ἀνάγκη μηνοειδῆ φαίνεσθαι.
 20 μέρος γάρ τι τοῦ κύκλου κατὰ τὴν ὄψιν εὐθύς
 ἐστὶν, τοῦ πρότερον¹ ἐξ ἐναντίας ὄντος, ὥστε τοῦ
 λαμπροῦ ἀποτέμνεται. εἴθ' οὕτως καὶ τὰ ἄκρα
 μένουσιν ἐν τῷ αὐτῷ, ὥστε ἀνάγκη μηνοειδῆ φαί-
 νεσθαι. μᾶλλον δὲ καὶ ἥττον διὰ τὴν τοῦ ἡλίου
 κίνησιν. μεταβαίνοντος γὰρ τοῦ ἡλίου καὶ ὁ κύκλος
 25 ὄν ὁρᾷ ἐπιστρέφεται, ἐν τοῖς αὐτοῖς σημείοις ὧν
 ἀπείρους γὰρ ἐγκλίσεις ἐγχωρεῖ αὐτὸν κλιθῆναι,
 εἴπερ γραφῆναι τοὺς μεγίστους κύκλους διὰ τῶν
 αὐτῶν σημείων ἀπείρους ἐνδέχεται.

Διὰ τί ὁ ἥλιος καὶ ἡ σελήνη σφαιροειδῆ ὄντα ἐπί- 8
 πεδα φαίνεται; ἢ ὅτι πάντα² ὄσων τὸ ἀπόστημα

¹ πρότερον Forster : προτέρου Kuelle.

PROBLEMS, XV. 7-8

and the sun sees it, that which is caused by the sun must be a circle. When, therefore, this is opposite to us, the whole is visible and it seems to be a full moon ; but when it changes owing to the passage of the sun, its circumference is opposite to our vision and so it seems to be a straight line. But the other part seems circular because it is a hemisphere, which is opposite to our vision. This part, therefore, appears semi-circular. For the moon is always opposite our vision. But when the sun falls upon it we do not see it, but after the eighth day it begins to fill up from the middle, because the sun in its passage makes the circle at a greater angle towards us. So as it turns towards us the circle resembles the section of a cone. It seems crescent-shaped when the sun passes on. For when the sun is at the extremes where the half moon appears, the circumference of the circle is seen. For it is no longer in a straight line with the vision, but is inclined. When this occurs and the sun is passing through the same points, it must appear crescent-shaped. For part of the circle which was previously opposite to us is now in line with our vision, so that it is cut off from illumination. Then the extremes also remain in the same position, so that they must appear crescent-shaped. This is more or less the case according to the movement of the sun. For as the sun changes position the circle which it sees revolves, being still on the same points ; it would be possible for it to incline at an infinite number of positions, for an infinite number of the greatest circles can be described through the same points.

Why do the sun and moon which are spherical ⁸ appear to be in one plane ? Is it because all bodies

² πάντα Forster : πάντων Ruelle.

912 a
 30 ἄδηλον, ὅτε πλείον ἢ ἔλαττον ἀφέστηκεν, ἐξ ἴσου φαίνονται; ὥστε καὶ ἐφ' ἐνὸς μὲν μόρια δ' ἔχοντος, ἂν μὴ τῇ χροῶ διαφέρῃ, ἀνάγκη τὰ μόρια ἐξ ἴσου φαίνεσθαι, τὸ δ' ἐξ ἴσου ὀμαλὲς καὶ ἐπίπεδον ἀνάγκη δοκεῖν εἶναι.

Διὰ τί τὰς σκιάς ποιεῖ ὁ ἥλιος ἀνίσχων καὶ δύνων 9
 35 μακράς, αἰρόμενος δὲ ἐλάττους, ἐπὶ τῆς μεσημβρίας δ' ἐλαχίστας; ἢ ὅτι ἀνίσχων τὸ μὲν πρῶτον παράλληλον ποιήσει τὴν σκιὰν τῇ γῆ, καὶ ἄπειρον ὡς [ἄνισον]¹ ὑπερτείνει, ἔπειτα μακράν· αἰεὶ δ' ἐλάττω διὰ τὸ αἰεὶ τὴν ἀπὸ τοῦ ἀνωτέρου σημείου εὐθείαν ἐντὸς πίπτειν; γνώμων τὸ ΑΒ, ἥλιος οὐ
 40 τὸ Γ καὶ οὐ τὸ Δ· ἢ δὲ ἀπὸ τοῦ Γ ἀκτίς, ἐφ' ἧς
 912 b τὸ ΓΖ, ἐξωτέρω ἔσται τῆς ΔΕ.² ἔστι δὲ σκιά ἢ μὲν ΒΕ ἀνωτέρω ὄντος τοῦ ἡλίου, ἢ δὲ ΒΖ κατωτέρω³. ἐλαχίστη δέ, ὅταν ἀνωτάτω ἦ⁴ καὶ ὑπὲρ τῆς κεφαλῆς.

Διὰ τί αἰ ἀπὸ τῆς σελήνης σκιαὶ μείζους τῶν 10
 5 ἀπὸ τοῦ ἡλίου, ὅταν ἀπὸ τῆς αὐτῆς ὦσι καθέτου; ἢ διότι ἀνώτερος ὁ ἥλιος τῆς σελήνης; ἀνάγκη οὖν ἐντὸς πίπτειν τὴν ἀπὸ τοῦ ἀνωτέρω ἀκτῖνα. γνώμων

¹ Bracketing [ἄνισον] with Forster.

² ΔΕ Forster : ΓΕ Ruelle.

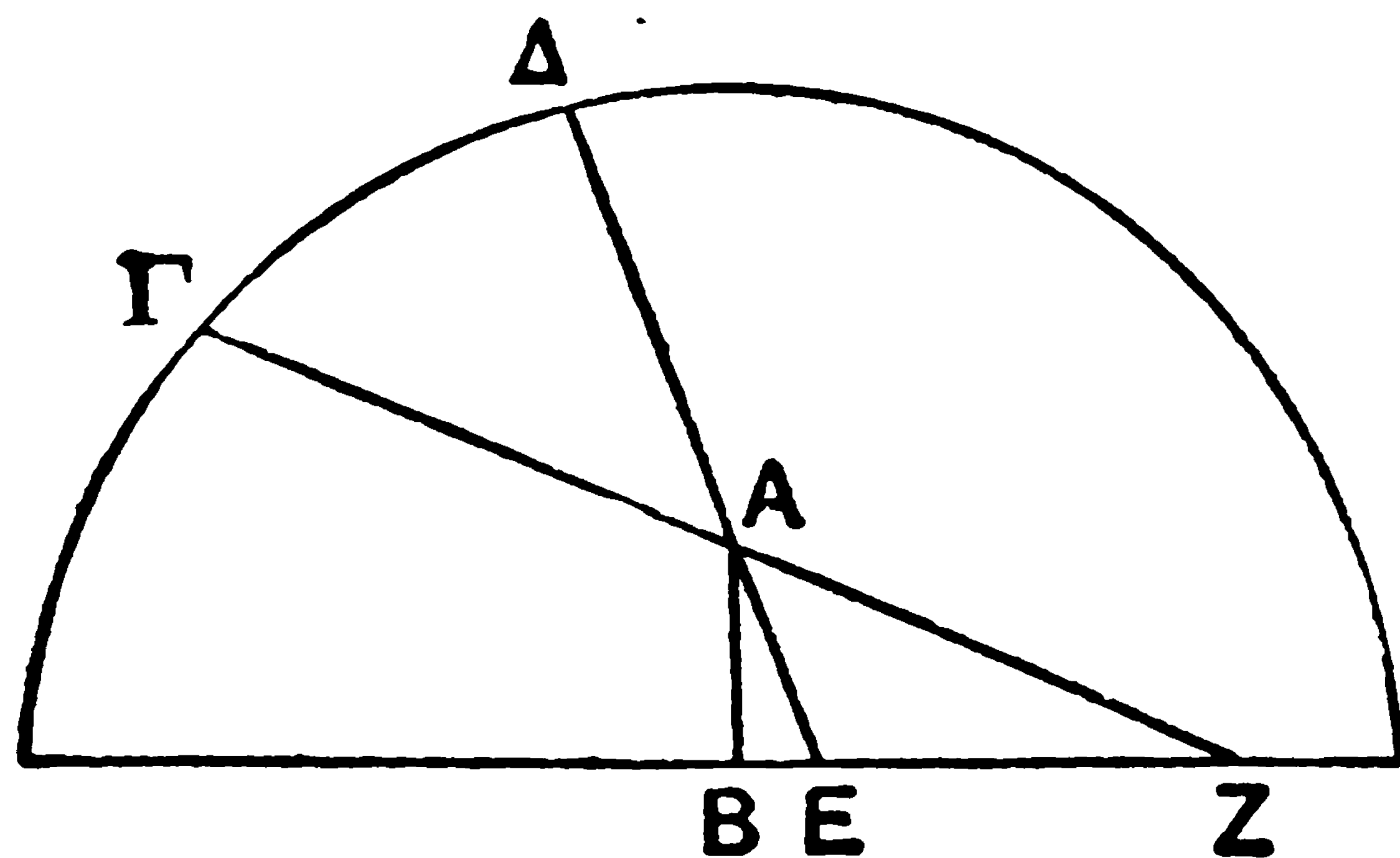
³ κατωτέρω Ross : κατωτάτω Ruelle.

⁴ ὅταν ἀνωτάτω ἦ Ross : ὅσω ἀνωτάτω, ἦ Ruelle.

PROBLEMS, XV. 8-10

whose distance is uncertain seem to be at an equal distance when they are nearer or farther away. So in the case of a single body which has parts unless there is a difference in colour, all the parts must seem to be in the same plane, but what is in the same plane must appear flat and in one surface.

Why does the sun produce long shadows when rising and setting, but smaller ones when high in the sky and smallest at midday? Is it because when rising at first the sun will produce a ray parallel to the earth, and cast it to an infinite distance, and next a long shadow; but this will grow less and less because the straight line from the sun above continually falls farther and farther inside the triangle? Suppose AB to be the index of a sun-dial, and the sun's successive



positions to be Γ and Δ . The ray from Γ , that is ΓZ , will fall outside the line ΔE . BE , then, is the shadow cast by the sun in the higher position, BZ from the lower position. The shadow, then, is least when the sun is highest, at the point, that is, when the sun is overhead.

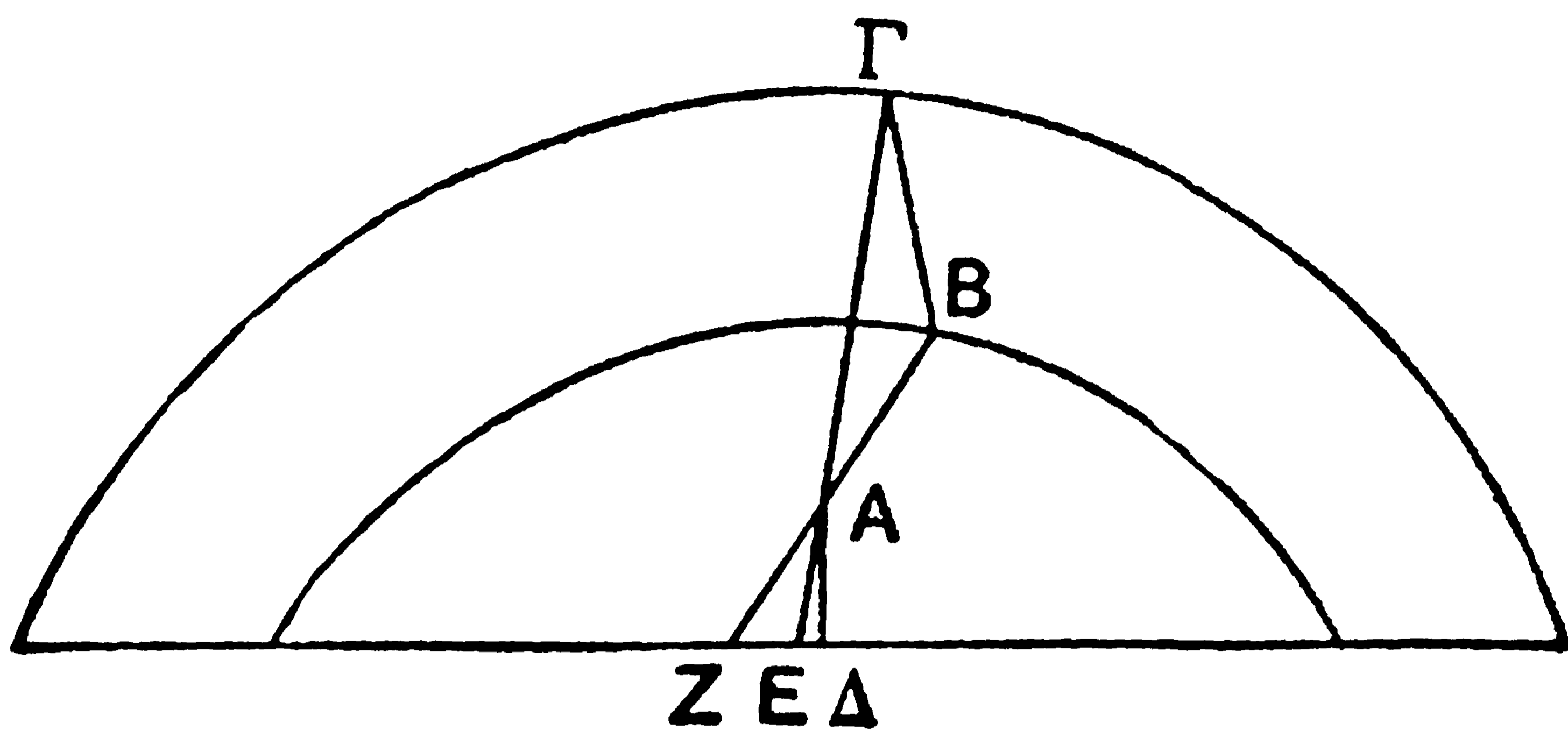
Why are shadows from the moon longer than those 10 from the sun, even when they are cast by the same perpendicular? Is it because the sun is higher in the heavens than the moon? And the ray from the higher body must fall inside. Let $A\Delta$ be the sun-dial

^{912 b} ἐφ' ᾧ ΑΔ, σελήνη Β, ἥλιος Γ. ἡ μὲν οὖν ἀπὸ
 τῆς σελήνης ἀκτῖς ΒΖ, ὥστε ἔσται σκιά ἢ τὸ
 ΔΖ· ἡ δὲ ἀπὸ τοῦ ἡλίου ἢ τὸ ΓΕ, ὥστε ἔσται
 10 σκιά ἐξ ἀνάγκης ἡπτων· ἔσται γὰρ τὸ ΔΕ.

Διὰ τί ἐν ταῖς τοῦ ἡλίου ἐκλείψεσιν, εἴαν τις 11
 θεωρῆ διὰ κοσκίνου ἢ φύλλων, οἷον πλατάνου ἢ
 ἄλλου πλατυφύλλου, ἢ τοὺς δακτύλους τῆς ἐτέρας
 χειρὸς ἐπὶ τὴν ἐτέραν ἐπιζεύξας, μηνίσκοι αἱ αὐγαὶ
 15 ἐπὶ τῆς γῆς γίνονται; ἢ ὅτι ὥσπερ δι' ὀπῆς εἰς
 λάμπη εὐγωνίου τὸ φῶς, στρογγύλον καὶ κῶνος
 γίνεται; αἴτιον δὲ ὅτι δύο γίνονται κῶνοι, ὃ τε
 ἀπὸ τοῦ ἡλίου πρὸς τὴν ὀπῆν καὶ ὁ ἐντεῦθεν πρὸς
 τὴν γῆν, καὶ συγκόρυφοι. ὅταν οὖν ἐχόντων οὕτως
 ἄνωθεν κύκλω ἀποτέμνηται, ἔσται μηνίσκος ἐξ
 20 ἐναντίας ἐπὶ τῆς γῆς τοῦ φωτός. ἀπὸ τοῦ μηνίσκου
 γὰρ τῆς περιφερείας γίνονται αἱ ἀκτῖνες, αἱ δὲ ἐν
 τοῖς δακτύλοις καὶ κοσκίνοις οἷον ὅπαι γίνονται·
 διὸ ἐπιδηλότερον γίνεται ἢ διὰ μεγάλων ὀπῶν. ἀπὸ
 δὲ τῆς σελήνης οὐ γίνονται, οὔτε ἐκλειπούσης οὔτε
 ἐν αὐξήσει οὔσης ἢ φθίσει, διὰ τὸ μὴ ἀκριβεῖς τὰς
 25 ἀπὸ τῶν ἄκρων αὐγὰς εἶναι, ἀλλὰ τῷ μέσῳ φαίνειν·
 ὃ δὲ μηνίσκος μικρὸν τὸ μέσον ἔχει.

PROBLEMS, XV. 10-11

index, B the moon and Γ the sun. The ray from the



moon will then be BZ, so that the shadow will be ΔZ ; but the ray from the sun will be ΓE , so that its shadow (ΔE) must necessarily be shorter.

Why is it that in an eclipse of the sun, if one looks 11 at it through a sieve or through leaves, such as a plane-tree or other broad-leaved tree, or if one joins the fingers of one hand over the fingers of the other, the rays are crescent-shaped where they reach the earth? Is it for the same reason as that when light shines through a rectangular peep-hole, it appears circular in the form of a cone? The reason is that there are two cones, one from the sun to the peep-hole and the other from the peep-hole to the earth, and the vertices meet. So when in these conditions the rays are cut off by a circle above, a crescent will be formed on the opposite side of the earth from the light. From the crescent formed by the circumference come the rays of light, but those which are seen through fingers and sieves are like peep-holes; hence they are more visible than through large holes. But they do not come from the moon, neither in eclipse nor when it is either waxing or waning, because the beams from the extremities are not clearly defined but it only sheds its light in the middle; but the middle part of the crescent is very small.

912^b Διὰ τί παρήλιος οὐ γίνεται οὔτε μεσουρανοῦντος 12
 τοῦ ἡλίου οὔθ' ὑπὲρ τὸν ἥλιον οὔθ' ὑπὸ τὸν ἥλιον,
 ἀλλ' ἐκ πλαγίων μόνον; ἢ διότι παρήλιος γίνεται
 30 κλωμένης τῆς ὄψεως πρὸς τὸν ἥλιον, αὕτη δὲ τοῦ
 ἀέρος ἢ στάσις, ἐφ' ἧς ἀνακλᾶται ἢ ὄψις, οὔτ'
 ἐγγὺς ἂν γένοιτο τοῦ ἡλίου οὔτε πόρρω; ἐγγὺς μὲν
 γὰρ οὔσαν ὁ ἥλιος διαλύσει, πόρρω δὲ οὔσης ἢ ὄψις
 οὐκ ἀνακλασθήσεται· ὑπὸ γὰρ μικροῦ ἐνόπτρου
 πόρρω ἀνατεινομένη ἀσθενῆς γίνεται. διὸ καὶ ἄλλως
 35 οὐ γίνονται. ἐξ ἐναντίας τοῦ ἡλίου μὲν οὖν εἰάν
 γίνηται καὶ ἐγγύς, διαλύσει ὁ ἥλιος, εἰάν δὲ πόρρω,
 ἐλάττων ἢ ὄψις προσπεσεῖται. εἰάν δὲ ἐν τῷ
 πλαγίῳ, ἔστι τοσοῦτον ἀποστῆναι τὸ ἐνόπτρον,
 ὥστε μήτε τὸν ἥλιον διαλύσει, μήτε τὴν ὄψιν
 ἀσθενῆ¹ ἀνελεῖν, διὰ τὸ ὑπὸ τὴν γῆν φέρεσθαι· ὑπὸ
 40 δὲ τὸν ἥλιον οὐ γίνεται διὰ τὸ πλησίον μὲν τῆς γῆς
 913^a ὄντος διαλύεσθαι ἂν ὑπὸ τοῦ ἡλίου, ἄνω δὲ μεσ-
 ουρανίου τὴν ὄψιν διασπᾶσθαι. καὶ ὅλως οὐδὲ ἐκ
 πλαγίας μεσουρανίου γίνεται, ὅτι ἢ ὄψις ὑπὸ τὴν
 γῆν εἰάν λίσαν φέρηται, ὀλίγη ἤξει εἰς τὸ ἔσοπτρον,
 ὥστε ἀνακλωμένη πάνυ² ἔσται ἀσθενῆς.

5 Διὰ τί τῆς σκιᾶς τὸ ἄκρον τοῦ ἡλίου τρέμειν 13
 φαίνεται; οὐ γὰρ δὴ διὰ τὸ φέρεσθαι τὸν ἥλιον
 ἀδύνατον γὰρ κινεῖσθαι εἰς τὰναντία, ὁ δὲ τρόμος
 τοιοῦτος. ἔτι δὲ ἄδηλος ἢ μετάβασις, ὥσπερ καὶ
 τοῦ ἡλίου αὐτοῦ. ἢ διὰ τὸ κινεῖσθαι τὰ ἐν τῷ ἀέρι;
 καλεῖται δὲ ξύσματα. φανερά δὲ ἔσται ἐν ταῖς
 10 ἀκτίσι ταῖς διὰ τῶν θυρίδων· ταῦτα γὰρ κινεῖται
 κἂν νηνεμία. ἐκ τε οὖν τῆς σκιᾶς εἰς τὸ φῶς ἐκ
 τε τοῦ φωτὸς εἰς τὴν σκιὰν φερομένων αἰεί, καὶ ὁ

¹ ἀσθενῆ Forster, cf. 913 a 4: ἀθρόαν Ruelle.

² πάν MS.

PROBLEMS, XV. 12-13

Why does the parhelion not appear when the sun 12 is in the middle of the sky nor either above or below the sun but only at the side of it? Is it because the parhelion is due to the bending of the visual ray towards the sun, and this is due to a static condition of the air, in which the light is refracted, and this cannot occur either close to the sun or far from it? For if it is near the sun will disperse it, and when it is far away the light will not be refracted; for if it is extended to a distance it becomes weak when refracted from a small mirror. So too no halo forms. If this refracting mirror is opposite the sun and near to it, the sun will disperse it, and if it is far away, the sight falling on it will be too weak. But when it is at the side, the mirror can be far enough away to prevent the sun from dispersing it, nor does the sight ascend in a weakened state by passing under the earth, but it does not appear below the sun because, being near the earth, it would be dispersed by the sun, nor does it appear above the sun in mid sky because the sight would be scattered. Nor does it even appear at the side when the sun is in mid sky, because if the sight travels too far beneath the earth, only a little will reach the mirror, so that when refracted it will be very weak.

Why does the edge of the shadow cast by the sun 13 seem to quiver? It is not because the sun is moving; for it cannot move in two directions at once, and this is implied by quivering. Moreover, its change of position is imperceptible, as is also that of the sun itself. Is it, then, due to the movement of bodies in the air? These are called motes. They can be seen in the rays passing through windows; for these move even in a complete calm. As they are continually travelling from shadow into light and from light into

ARISTOTLE

913 a ὄρος ὁ κοινὸς τοῦ φωτὸς καὶ τῆς σκιᾶς φαίνεται
κινούμενος παρεγγύς. ἦ γὰρ οἶον σκιὰν ποιούσιν,
15 ἦ δὲ φῶς, ἐκατέρωθεν μεταβάλλοντα ταῦτα. ὥστε
ἢ σκιὰ φαίνεται κινεῖσθαι, οὐ κινουμένη αὐτὴ οὕ-
τως, ἀλλ' ἐκεῖναι.¹

¹ ἐκεῖνα Bussemaker : ἐκεῖναι Ruelle.

PROBLEMS, XV. 13

shadow, so the boundary-line between the light and the shadow is seen moving in a similar way. For the motes, changing their position from one side to the other, as it were cause a shadow in one place and a light in another. So that the shadow seems to move, though it does not move in this way itself, but it is the motes which move.

ΘΣΑ ΠΕΡΙ ΤΑ ΑΨΥΧΑ

913 ^a Διὰ τί αἱ μὲν βάσεις τῶν πομφολύγων λευκαὶ ἐν 1
 20 τοῖς ὕδασι; καὶ ἐὰν ἐν ἡλίῳ τεθῶσι, σκιὰν οὐ
 ποιούσιν, ἀλλ' ἢ μὲν ἄλλη πομφόλυξ σκιὰν ποιεῖ,
 ἢ δὲ βᾶσις οὐ ποιεῖ, ἀλλ' ἡλίωται κύκλῳ. τὸ δὲ
 ἐπι θαυμασιώτερον, ὅτι οὐδ' ἐάν τι τεθῆ ξύλον εἰς
 τὸ ὕδωρ ἐν τῷ ἡλίῳ, τέμνεται ὑπὸ τοῦ ὕδατος
 25 ταύτη.¹ ἢ οὐ γίνεται σκιά, ἀλλ' ἡλίω διήρηται ἢ
 σκιά; εἰ οὖν σκιά ἐστὶν τὸ μὴ ὁρώμενον, καὶ ὑπὸ
 τοῦ ἡλίου κύκλῳ ἂν ὁρώτο ὁ ὄγκος. τοῦτο δὲ ὅτι
 ἀδύνατον, δείκνυται ἐν τοῖς ὀπτικοῖς· οὐδὲ γὰρ τὸ
 ἐλάχιστον ὑπὸ τοῦ μεγίστου ἐνδέχεται ὅλον περι-
 οφθῆναι.

Διὰ τί αἱ πομφόλυγες ἡμισφαίρια; ἢ διὰ τὸ ὡς 2
 30 ἀπὸ κέντρου πρὸς τὸν αἶρα φέρεσθαι ἄνω ὁμοίως
 πάντη; ἀνάγκη δὲ τοῦτο ἡμισφαίριον εἶναι. τὸ
 κάτω δὲ ἡμισφαίριον ἀποτέμνεται ὑπὸ τοῦ ἐπιπέδου
 τοῦ ὕδατώδους, ἐν ᾧ τὸ κέντρον ἐστίν.

Διὰ τί τοῖς ἄνισον τὸ βάρος² ἔχουσι μεγέθεσιν, ἐάν 3
 35 τις τὸ κουφότερον κινῆ, κύκλῳ περιφέρεται τὸ
 βαλλόμενον, οἷον τοῖς μεμολιβδωμένοις ἀστραγάλοις
 συμβαίνει, ἐάν τις βάλλῃ τὸ κουφότερον πρὸς αὐτὸν
 στρέψας μέρος; ἢ ὅτι τὸ βαρύτερον ἀδύνατον

¹ ταύτη Forster: ταῦτα Kuelle.

² βάρος Syllburg: βάθος Kuelle.

BOOK XVI

PROBLEMS CONNECTED WITH INANIMATE OBJECTS

Why are the bases of bubbles white in the water? 1
And if they are placed in the sun, they do not make a shadow, but the rest of the bubble produces a shadow, but the base does not, but has sunshine all round it in a circle. But this is even more remarkable, that even if one puts a plank into the water in the sun, the shadow is cut off by the water at that point. Perhaps there is no shadow, but it is dispersed by the sun. If, then, a shadow may be defined as that which is not seen, then the whole mass must be seen all round by the sun. That this is impossible has been shown in books on optics; for it is not possible for the smallest sphere to be seen complete by the greatest.

Why are bubbles hemispherical? Is it because 2 they extend upwards from the centre equally in every possible direction? Such a figure must be hemispherical. But the lower hemisphere is cut off by the plane surface of the water, at which the centre is situated.

Why is it true of bodies of unequal weight that if 3 one moves the lighter part of them, what is cast revolves in a circle, as we see with loaded dice, if one casts the die with the lighter part turned towards one? Is it because the heavier part cannot travel at the

918^a ἰσοδρομεῖν τῷ κουφοτέρῳ, ἀπὸ τῆς αὐτῆς ἰσχύος
 918^b ῥιφθέν; ἐπεὶ δὲ ἀνάγκη μὲν πάνπαν κινεῖσθαι, ἐξ
 ἴσου δὲ ἀδύνατον, ὁμοταχῶς μὲν φερόμενα τὴν
 αὐτὴν οἰσθήσεται γραμμὴν, θᾶττον δὲ θατέρου
 φερομένου κύκλον ἀνάγκη φέρεσθαι, ἐπειδὴ ἐν
 τούτῳ μόνῳ τῷ σχήματι ταῦτα αἰεὶ κατάλληλα ὄντα
 5 σημεῖα ἐν ταύτῳ χρόνῳ ἀνίσους διέρχεται γραμμάς.

Διὰ τί τὰ πίπτοιτα ἐπὶ τὴν γῆν καὶ ἀφαλλόμενα 4
 ὁμοίας γωνίας ποιεῖ πρὸς τὸ ἐπίπεδον ἐφ' ἑκάτερα
 τοῦ σημείου ὡς ἤψατο τοῦ ἐπιπέδου; ἢ ὅτι πάντα
 μὲν φύσει φέρεται πρὸς ὀρθήν; τὰ μὲν οὖν εἰς
 10 ὁμαλὲς πεσόντα, τῇ καθέτῳ καὶ τῇ διαμέτρῳ προσ-
 κρούσαντα τῷ ἐπιπέδῳ, τοσαύτας ποιεῖ γωνίας
 ἀφαλλόμενα διὰ τὸ τὴν μὲν διάμετρον ἴσα διαιρεῖν·
 τὰ δὲ εἰς τὰ πλάγια πίπτοντα, οὐ τῇ καθέτῳ προσ-
 κρούονται τῷ χωρίῳ, ἀλλὰ τῷ ἀνωτέρῳ τῆς
 καθέτου σημείῳ, συμβαίνει πάλιν ἀνωσθέντα ὑπὸ
 15 τοῦ πληγέντος τόπου εἰς τοῦναντίον φέρεσθαι, τὰ
 μὲν στρογγύλα, ὅτι ἐν αὐτῷ φερόμενα εἰς τοῦ-
 ναντίον τῆς ἀπώσεως ἐξελίττεται, εἴαν τε ἡρεμῇ τὸ
 μέσον αὐτῶν εἴαν τε καὶ τόπον διαλλάττη· τὰ δ'
 εὐθύγραμμα διὰ τὸ τὴν κάθετον αὐτὴν εἰς τοῦμ-
 προσθεν προσενεχθεῖσαν¹ ἐκκρούεσθαι, καθάπερ
 20 τοῖς τε ξυρουμένοις τὰ σκέλη συμβαίνει, καὶ ὧν
 τοὺς κολύθρους ὑφαρπάζουσιν. πάντες γὰρ οὗτοι
 εἰς τοῦναντίον καὶ ὀπισθεν ἐπιπίπτουσιν. διὰ τὸ
 ἰσάζειν αὐτὰ τὴν κάθετον, μετέωρόν τε εἶναι καὶ εἰς
 τοῦμπροσθεν ἐκκρούεσθαι· τὰ γὰρ ἐναντία δῆλον
 ὅτι αὐτῆς ὀπισθέ τε καὶ κάτω συμβήσεται γίνεσθαι,
 25 κάτω δὲ φερόμενα βαρύτερα ἂν εἴη. ὁ οὖν τούτοις

¹ προσενεχθεῖσαν Forster: προσηνέχθη Kuelle.

same pace as the lighter, when thrown with the same strength? But since the whole must move, and cannot move at an equal pace, if it travelled at the same speed it would travel in the same straight line, but with one part travelling more rapidly it must move in a circle, since it is only in such a figure that these parts which are always opposite can travel an unequal path in the same time.

Why is it that bodies which fall to the ground and rebound make equal angles with the surface upon each side of the point at which they touch the surface? Is it because all bodies naturally travel in a straight line? So bodies which fall on flat ground, which strike it perpendicularly or diametrically, make similar angles when they rebound, because the diameter divides the circle into equal parts. But bodies which fall obliquely, not striking the spot perpendicularly, but at a point above the perpendicular, when hurled back by the ground which they strike travel in the opposite direction. In the case of round objects, it is because when travelling they revolve in a direction opposite to that in which they are thrust back, whether the centre is at rest or changes its position: in the case of a rectilinear object it is due to the fact that the perpendicular itself is first thrown forwards and then cast backwards. The same thing happens with those who have their legs knocked from under them or have the scrotum pulled down. For all such fall in the opposite direction and backwards. This is because the perpendicular gives them their balance, and this is raised and knocked forwards. So evidently the opposite of this position will arise and they will fall backwards and downwards, and objects travelling downwards would be heavier.

913^b πτώμα, τοῖς ἀφαλλομένοις φορὰν συμβαίνει γίνε-
 σθαι. πρὸς ὀρθὴν μὲν οὖν οὐδέτερα αὐτῶν ἀφ-
 ἄλλεται διὰ τὸ τὴν μὲν κάθετον δίχα τῷ βάθει¹
 διαιρεῖν τὰ φερόμενα, καθέτους δὲ πλείους πρὸς
 ταῦτ' ἐπίπεδον μὴ γίνεσθαι τεμνούσας αὐτάς· ὁ
 20 τοῦτοισι συμβήσεται καθέτου γινομένης κατὰ τὴν
 ἔφαλον, ἢ προσέκρουσε τῷ ἐπιπέδῳ τὸ φερόμενον,
 διχοτομεῖσθαι πάλιν ὑπ' αὐτῆς αὐτὸ συμβήσεται,
 ὥστε ἀναγκαῖον τέμνεσθαι ὑπ' αὐτῆς τὴν πρώτην
 κάθετον ὑφ' ἧς ἐφέρετο. ἐπεὶ δ' εἰς τοῦναντίον μὲν
 οἰσθήσεται, πρὸς ὀρθὴν δὲ οὐκ οἰσθήσεται, λοιπὸν
 25 ὀξείαν γίνεσθαι γωνίαν τὴν ἐπὶ θατέρῳ τοῦ προσ-
 πεσόinton τῷ ἐπιπέδῳ σημείου· ὅρος γάρ ἐστιν ἡ
 ὀρθὴ τῶν ἐναντίων γωνιῶν.

Διὰ τί ὁ μὲν κύλινδρος ὡσθεὶς εἰς εὐθύ τε φέρεται 5
 καὶ γράφει εὐθείας τοῖς ὀρίζουσιν αὐτὸν κύκλοις,
 ὁ δὲ κῶνος κύκλῳ περιφέρεται, τῆς κορυφῆς με-
 814^a νούσης, καὶ γράφει τὸν κύκλον τῷ ὀρίζοντι κύκλῳ;
 κύκλῳ μὲν ἀμφοτέρω φέρεται, γράφει δ' ἐν τῷ
 ἐπιπέδῳ ὁ μὲν κύλινδρος εὐθείας, ὁ δὲ κῶνος
 κύκλους, διὰ τὸ τοὺς μὲν ἐν τῷ κώνῳ ἀνίσους εἶναι
 κύκλους, φέρεσθαι δὲ αἰεὶ θᾶπτον τὸν μείζονα τῶν
 5 περὶ τὸ αὐτὸ κέντρον. φερομένων δὲ ἀνίσως
 πάντων ἅμα τῶν ἐν τῷ κώνῳ κύκλων, συμβαίνει
 τοὺς ἐξωτάτω πλείστον ἐν ταύτῳ χρόνῳ τόπον καὶ
 γραμμὴν φέρεσθαι· διὸ καὶ κύκλῳ φέρονται. γρά-
 φονταιί τε γὰρ πάντες τῇ αὐτῇ εὐθείᾳ, καὶ τῆς
 10 εὐθείας κύκλῳ μὲν φερομένης οὐ πάντα τὰ ἐν αὐτῇ

¹ βάρει Kuelle.

^a The centre of the circle described is the apex of the cone.

PROBLEMS, XVI. 4-5

What is a fall to these people is movement in rebounding objects. Neither round nor rectilinear objects rebound at right angles because the perpendicular divides travelling bodies in two in the direction of their depth, and there cannot be more than one perpendicular to the same surface dividing them. What will happen if the perpendicular is formed on the rebound, at the point at which the travelling body strikes the surface, is that it will again be bisected by the perpendicular, so that the first perpendicular (that by which it travelled) must be cut by the second. When, then, it is carried in the opposite direction, it will not travel at right angles; it must follow that the angle which it makes on either side of the point where the body strikes the surface must be an acute angle; for the right angle is the division between the two opposite angles.

Why does a cylinder when rolled along travel straight and describe straight lines with its circular ends, whereas a cone travels in a circle, if its apex remains still, and describes a circle with its circular end? Of course both travel in a circle, but the cylinder describes straight lines on a plane surface, while a cone describes circles, because the circles of which a cone is composed are unequal, and the greater circle is always travelling faster than those near the centre itself.^a As, then, all the circles, the sum of which constitutes the cone, are travelling at different velocities, the outside circles cover the greatest distance and describe the longest line in the same time. So they travel in a circle. For all the circles are being described by the same straight line, and as this line ^b travels in a circle, all points on it do

^b The "line" is the line of contact of the cone with the plane surface.

914^a σημεία ἴσην ἐν ταύτῳ χρόνῳ γράφει γραμμὴν, εἰς
 εὐθὺ δὲ φέρει τὴν ἴσην. τοῦ δὲ κυλίνδρου πάντων
 ἴσων οἴτῳ τῶν κύκλων καὶ περὶ ταυτό κέντρον,
 συμβαίνει τὰ ἅμα τοῦ ἐπιπέδου ἐν αὐτοῖς πάνθ'
 ἀπτομέιους σημεία, φέρεσθαι τε ἰσοταχεῖς κυλιο-
 15 μέιους διὰ τὸ τοὺς κυλίνδρους ἴσους εἶναι, καὶ
 ἦκει ἐπὶ τὸ ἐπίπεδον πάλιν ἅμα ἐκκυλισθέντα
 ἕκαστον τὸν αὐτοῦ κύκλον, ὥστε καὶ τὰς ἐν τῷ
 ἐπιπέδῳ εὐθείας ἴσας γίνεσθαι. τῇ γὰρ αὐτῶν ἀφῆ
 αὐτὰς ἔγραψαν, ὄντες ἴσοι τε καὶ ἰσοταχεῖς. ἐγί-
 νοιτο δὲ εὐθεῖαι αἱ ὑπὸ τῆς αὐτῆς γραφεῖσαι
 20 γραμμῆς εἰς εὐθὺ φερομένης, ὥστε διὰ ταύτας εἰς
 εὐθὺ ἂν φέροιτο¹ ὁ κύλινδρος. διαφέρει γὰρ οὐθέν,
 ἢ ἢ πρώτη ἦψατο ὁ κύλινδρος τοῦ ἐπιπέδου
 γραμμῆ, ταύτη ἔλκειν ἐν τῷ ἐπιπέδῳ, ἢ ἐγκυλίειν
 αὐτό. αἰεὶ γὰρ ἴσην καὶ ὁμοίαν γραμμὴν τῶν ἐν
 τῷ κυλίνδρῳ συμβήσεται ἀπτεσθαι τοῦ ἐπιπέδου,
 ἔλκομένου τε καὶ κυλιομένου τοῦ κυλίνδρου.

22 Διὰ τί τῶν βιβλίων ἢ τομὴ οὖσα ἐπίπεδος καὶ 6
 εὐθεῖα, εἴαν μὲν τις τέμῃ παρὰ τὴν βάσιν, γίνεται
 εὐθεῖα ἀνελιττομένη, εἴαν δὲ ἐγκλίνας, σκολιά; ἢ
 ὅτι συμβαίνει τῶν ἐν τῇ ἑτέρα τομῇ κύκλων ἐν
 ταύτῳ ἐπιπέδῳ ὄντων τὴν ἐγκεκλιμένην τομὴν μὴ
 30 παρακειμένην εἶναι, ἀλλ' ἐν τῇ μὲν πλείον, τῇ δὲ
 ἕλαττον αὐτῆς ἀπέχειν, ὥστε ἐξελιττομένου οἱ μὲν
 ἐν ταύτῳ ἐπιπέδῳ ὄντες κύκλοι, καὶ τὴν ἀρχὴν
 ἔχοντες ἐν ταύτῳ ἐπιπέδῳ, τὴν ἐξ αὐτῶν ποιήσουσι
 γραμμὴν ἐξελιττόμενοι; ἔστι γὰρ ἢ γινομένη
 γραμμὴ ἐκ τῶν κύκλων οἱ εἰσιν ἐν ταύτῳ ἐπιπέδῳ.
 35 ὥστε καὶ εὐθεῖα οὖσα ἐν ἐπιπέδῳ. ἢ τε τῆς λοξῆς

¹ ἂν φέροιτο Forster : ἀναφέροιτο Kuelle.

^a The book is a rolled manuscript and so a cylinder.

PROBLEMS, XVI. 5-6

not describe a line of the same length in the same time, but it can only describe equal lines if it travels on a straight path. But in a cylinder all the circles of which it is composed are equal, and move about the same centre, so that all the points on these touch the surface at the same time, and, as they revolve, they travel at the same speed, because cylinders are symmetrical, and reaching a point on the circle each as it revolves returns to the surface at the same moment, so that the straight lines it describes on the surface are also equal; for these circles have described the lines by their own contact, being themselves equal and travelling at an equal speed. Now all lines drawn by the same straight line travelling in a straight line are straight, so that along these the cylinder would naturally travel in a straight path. For it makes no difference whether you drag the cylinder over the surface in a straight line in the position in which it first touched the surface, or whether you roll it; for the result is that an equal and similar straight line described by points on the cylinder will always touch the surface, whether it is dragged or rolled.

Why is it that, when a book ^a is cut level and straight, if the cut is made parallel to the base, it will still be straight, when it is unrolled, but crooked if it be cut on the slant? Is it because, though in the previous cutting the circles were all in the same plane, the slanting cut is not parallel, but on one side of the roll it is nearer and on the other side farther from the original cut, so that when it is unrolled, some of the circles which were in the same plane and had their origin in the same plane, will make, when unrolled, a line of their own? For the resulting line was made from circles which are in the same plane, so that the line on a plane is also straight. But the line unrolled

914 a

τομῆς ἐξελιττομένη γραμμὴ οὐκ οὔσα παρὰ τὴν
 πρώτην, ἀλλὰ τῇ μὲν πλέον, τῇ δὲ ἔλαττον αὐτῆς
 διεστηκυῖα διὰ τὸ καὶ τὴν τομὴν οὕτως ἔχει πρὸς
 αὐτήν, οὐκ ἐν ἐπιπέδῳ ἔσται, ὥστε οὐδ' εὐθεία· τῆς
 γὰρ εὐθείας οὐκ ἔστι τὸ μὲν ἐν ἄλλῳ, τὸ δὲ ἐν
 ἄλλῳ ἐπιπέδῳ.

914 b

Διὰ τί διαιρούμενα τὰ μεγέθη ἐλάττω φαίνεται ἡ
 πάντα τοῦ ὅλου; ἢ ὅτι διαιρούμενα μὲν ἀριθμὸν
 ἔχει πάντα, μεγέθει δὲ ἐλάττω ἐστὶ τοῦ ἐνός; τὸ
 μὲν γὰρ μέγα τῷ κατὰ συνέχειαν εἶναι καὶ ποσόν
 5 τι μέγα λέγεται, ὁ δὲ ἀριθμὸς τε πᾶς παντὸς με-
 γέθους ἀριθμοῦ μείζων. διόπερ εἰκὸς τὸ ὅλον δι-
 αιρεθέντων τῶν μερῶν μείζον φαίνεσθαι· τῶν αὐτῶν
 γὰρ ὄντων αὐτῶν τὸ μὲν ὅλον τὴν τοῦ μεγέθους
 ἔχει μᾶλλον φύσιν, συνεχὲς ὄν, τὰ δὲ μέρη τὴν τοῦ
 ἀριθμοῦ.

Τῶν περὶ τὴν κλεψύδραν συμβαινόντων τὸ μὲν 8
 10 ὅλον ἔοικεν αἴτιον εἶναι καθάπερ Ἀναξαγόρας
 λέγει· ὁ γὰρ ἀήρ ἐστὶν αἴτιος, ἐναπολαμβανόμενος
 ἐν αὐτῇ, τοῦ μὴ εἰσιέναι τὸ ὕδωρ ἐπιληφθέντος τοῦ
 αὐλοῦ. οὐ μὲν ἀπλῶς γε αἴτιος· κἂν γάρ τις αὐτὴν
 πλαγίαν ἐνῆ εἰς τὸ ὕδωρ, ἐπιλαβὼν τὸν αὐλόν,
 εἴσεισι τὸ ὕδωρ. διόπερ οὐ λέγεται ὑπ' αὐτοῦ
 15 ἱκανῶς ἢ αἰτιόν ἐστιν. ἔστι δὲ αἴτιον μὲν, καθάπερ
 εἴρηται, ὁ ἀήρ· οὗτος δὲ ὠθούμενός τε καὶ καθ'
 ἑαυτὸν φερόμενος καὶ μὴ βιαζόμενος ἐπ' εὐθείας

^a The clepsydra was made of metal (never of glass), and consisted of a spherical bulb, probably flattened at the top (hence the term *κωδία*, poppy-head), into which was inserted a narrow tube (*αὐλός*). The upper end of the tube could be

from the slanting cut is not parallel to the first, but is more distant from it on one side and less distant on the other owing to the fact that the new cut bears this relation to the original, so it will not be in one plane, and therefore not straight either. For one part of a straight line cannot be in one plane, while another is in a different plane.

Why do magnitudes when divided appear to be 7 smaller than the complete whole? Is it because all divided things have numbers, and in size each is less than the undivided whole? For an object is called large by the fact that it has a large size and continuity, but the number of its parts is always greater than the number of the undivided whole. So it is natural that the whole should seem larger than the divided parts; for though both are actually the same size, the undivided whole has more the nature of size, being continuous, but the parts have more the character of number.

The general explanation of the features of the 8 water-clock ^a is as Anaxagoras states; for the air is the cause, being enclosed in the clock, which prevents the water from entering when the tube is closed. But it is not the complete cause; for if one puts the clock into water aslant, and blocks the tube, the water will enter. So his explanation of the cause is insufficient. As has been said before, the air is the cause; but this, being thrust or when travelling by itself and not under pressure, tends to travel in a closed by a stopcock, or other device (*ἐπιλαβεῖν*). The bottom of the ball was perforated with small holes (*τρυπήματα, ἦθμός*), through which the water percolated slowly, so long as the stopcock was open. We have evidence that his clepsydra was regularly used in the law-courts in Aristophanes' day; its use in private houses is uncertain but not improbable.

914 b πέφυκεν φέρεσθαι, καθάπερ καὶ ἄλλα στοιχεῖα.
 πλαγίας μὲν οὖν βαφείσης τῆς κλεψύδρας διὰ τῶν
 20 ἐναντίων τοῖς ἐν τῷ ὕδατι τρυπημάτων ἐπ' εὐθείας
 μένων ὑπὸ τοῦ ὕδατος ἐξέρχεται, ὑποχωροῦντος δὲ
 αὐτοῦ τὸ ὕδωρ εἰσέρχεται· ὀρθῆς δὲ εἰς τὸ ὕδωρ
 βαφείσης τῆς κλεψύδρας, οὐ δυνάμενος πρὸς ὀρθὴν
 ὑποχωρεῖν διὰ τὸ πεφραῆσθαι τὰ ἄνω, μένει περὶ τὰ
 πρῶτα τρυπήματα· σάπτεσθαι¹ γὰρ εἰς αὐτὸν² οὐ
 25 πέφυκεν. σημεῖον δ' ἐστὶ τοῦ εἴργειν δύνασθαι τὸ
 ὕδωρ ἀκινητίζοντα τὸν ἀέρα τὸ ἐπ' αὐτῆς γινόμενον
 τῆς κλεψύδρας. εἰάν γάρ τις αὐτῆς αὐτὴν τὴν
 κωδίαν ἐμπλήσας ὕδατος, ἐπιλαβὼν τὸν αὐλόν,
 καταστρέψῃ ἐπὶ τὸν αὐλόν, οὐ φέρεται τὸ ὕδωρ διὰ
 τοῦ αὐλοῦ ἐπὶ στόμα. ἀνοιχθέντος δὲ τοῦ στόματος
 30 οὐκ εὐθὺς ἐκρεῖ κατὰ τὸν αὐλόν, ἀλλὰ μικροτέρῳ
 ὕστερον, ὡς οὐκ ὄν ἐπὶ τῷ στόματι τοῦ αὐλοῦ,
 ἀλλ' ὕστερον διὰ τούτου φερόμενον ἀνοιχθέντος.
 πλήρους τε καὶ ὀρθῆς οὔσης τῆς κλεψύδρας, ἀν-
 οιχθέντος τοῦ αὐλοῦ εὐθὺς ρεῖ διὰ τοῦ ἡθμοῦ, διὰ τὸ
 ἐκείνου μὲν ἄπτεσθαι, τῶν δὲ ἄκρων τοῦ αὐλοῦ μὴ
 35 ἄπτεσθαι. οὐκ εἰσέρχεται μὲν οὖν τὸ ὕδωρ εἰς τὴν
 κλεψύδραν διὰ τὴν προειρημένην αἰτίαν, ἐξέρχεται
 δὲ ἀνοιχθέντος τοῦ αὐλοῦ διὰ τὸ τὸν ἐν αὐτῷ ἀέρα
 κινούμενον ἄνω καὶ κάτω πολλὴν κίνησιν³ ποιεῖν
 τοῦ ἐν τῇ κλεψύδρα ὕδατος. ὠθούμενον δὲ κάτω
 καὶ αὐτὸ ρέπον εἰς αὐτὸ εἰκότως ἐκρεῖ, βιαζόμενον
 915 a τὸν ἐκτὸς τῆς κλεψύδρας ἀέρα κινούμενόν τε καὶ
 ὄντα ἴσον τῇ δυνάμει τῷ ἐπωθοῦντι αὐτὸν ἀέρι, τῇ
 δὲ ἀντερείσει ἀσθενέστερον ἐκείνου διὰ τὸ διὰ
 στενοῦ αὐτὸν τοῦ αὐλοῦ ρέοντα θᾶπτον καὶ σφοδρό-
 τερον ρεῖν, καὶ προσπίπτειν τῷ ὕδατι. τοῦ δέ,

¹ σάπτεσθαι Bonitz : ἄπτεσθαι Ruelle.

² αὐτὸν Diels : αὐτὸν Ruelle.

³ κίνησιν Forster from Th. G. : κένωσιν Ruelle.

straight line, as other elements do. But when the water-clock is dipped sideways, the air remains on its straight course through the holes opposite to those in the water and is driven out by the water, and as the air recedes the water enters. But when the water-clock is dipped upright into the water, as the air cannot escape at right angles because the upper holes are blocked, it remains about the first holes, for it cannot contract into itself. That the air, if it does not move, can keep out the water is proved by what happens with the water-clock. For if one fills the head itself with water, and stopping the tube inverts it with the tube downwards, the water does not travel through the tube to the mouth. When the mouth is opened the water does not flow out immediately along the tube, but only after a little time, as it is not at the mouth of the tube, but is carried down it later after it is opened. But if the water-clock is full and held upright, when the tube is opened, the water flows at once through the strainer,^a because it touches it but does not touch the extremities of the tube. The water, then, does not flow into the water-clock for the reason before mentioned, but flows out when the tube is opened because the air moving up and down in it causes much movement of the water in the clock. But when it is thrust downwards and itself tends in that direction, it naturally flows out, forcing a passage through the air outside the water-clock, which is in motion and is equal in force to the air which is pressing upon it, but weaker than the counteracting resistance, because it flows with greater velocity and more violence through the narrow tube, and presses upon the water. The reason why the

^a *i.e.* the holes at the bottom.

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5 πωμασθέντος τοῦ αὐλοῦ, μὴ συρρεῖν τὸ ὕδωρ αἴτιον,
 ὅτι τὸ ὕδωρ εἰσιὸν εἰς τὴν κλεψύδραν ἐξωθεῖ βία
 τὸν ἀέρα ἐξ αὐτῆς. σημεῖον δέ ἐστι τὸ γινόμενον
 ἐν ταύτῃ πνεῦμα καὶ ἐρυγμός. εἰσιόντος δὲ τοῦ
 ὕδατος, βία ὠθοῦν συνεισπίπτει εἰς τὸν αὐλὸν αὐτοῦ,
 καθάπερ τὰ ἐμπιεστά¹ ξύλα ἢ χαλκὸς τῇ διαιρέσει
 10 πιεζόμενος, μένει ἄνευ παντὸς ἄλλου συνδέσμου,
 ἕως ἂν ἐκκρουσθῇ ἐκ τοῦ ἐναντίου, καθάπερ τοὺς
 κατεαγότας ὀπιούρους ἐν τοῖς ξύλοις ἐκκρούουσιν.
 συμβαίνει δὲ τοῦτο ἀνοιχθέντος τοῦ αὐλοῦ γίνεσθαι
 διὰ τὰ προειρημένα. ἢ οὖν διὰ ταῦτα εἰκὸς ἐστίν
 αὐτὸ μὴ ἐκρεῖν, ἢ ἐξιόντος βιαίου ἀέρος καὶ πνευ-
 15 ματουμένου. δηλοῖ δὲ ὁ ψόφος ἐπισπᾶσθαι τῷ
 πνεύματι τὸ ὕδωρ ἄνω, ὥσπερ ἐπὶ πολλῶν συμ-
 βαίνει γίνεσθαι. ἐπισπώμενον δὲ καὶ συνεχές ὄν
 αὐτῷ πᾶν τὸ ὕδωρ μένει πιεζόμενον ὑπὸ τοῦ ἀέρος,
 ἕως ἂν ἀπωσθῇ πάλιν ὑπ' αὐτοῦ. τῆς δὲ ἀρχῆς
 μενούσης, καὶ τὸ ἄλλο ἐξ αὐτῆς κρέματα ὕδωρ ἐν
 20 καὶ συνεχές. εὐλογον δὲ τοῦτο γίνεσθαι· τοῦ γὰρ
 αὐτοῦ ἐστὶ κινήσαί τε ἐκ τῆς οἰκείας χώρας τι, καὶ
 τοῦτο ἴσχειν, ὡς ἐκίνησεν,² ἐν πλείονι δὲ χρόνῳ, εἰ
 ἢ ὅμοια τῇ δυνάμει τό τε ἔχον καὶ τὸ ἐχόμενον, ἢ
 τὸ ἔχον κρείττον, ὅπερ ἐνταῦθα συμβαίνει· πνεῦμα
 γὰρ ὕδατός ἐστι κρείττον τῇ δυνάμει.

25 Διὰ τί τὰ μόρια τῶν φυτῶν καὶ τῶν ζώων, ὅσα
 μὴ ὀργανικά, πάντα περιφερῆ, τῶν μὲν φυτῶν τὸ
 στέλεχος καὶ οἱ πτόρθοι, τῶν δὲ ζώων κνήμαι,
 μηροί, βραχίονες, θώραξ; τρίγωνον δὲ οὐδὲ πολύ-
 γωνον οὔτε ὄλον οὔτε μόριόν ἐστίν. πότερον,
 ὥσπερ Ἀρχύτας ἔλεγεν, διὰ τὸ ἐν τῇ κινήσει τῇ

¹ ἐμπιεστά Υ^a : ἐκπιεστά Ruelle.

² ὡς ἐκίνησεν Bussemaker : ὡς ἐκείνης MS.

water does not flow when the tube is closed is that the water as it flows into the water-clock forcibly drives the air out of it. This is proved by the breath and sucking noise that takes place. But when the water enters, the air driving it forcibly along falls into the tube, and (like wedges of wood or bronze driven in by cleavage) it remains without anything else to hold it until it is driven out from the opposite direction, just as they knock out pegs which are broken in timber. This happens when the pipe is opened for the reason aforesaid. For these reasons, then, it is natural that the water should not flow out, or else because air is violently making its way out and is expanding. The noise produced proves that the water is drawn up by the air, as also occurs in many other cases. But when all the water is contracted and is continuous under pressure from the air, it remains still, until it is driven back again by the air. But since the first part of the water remains there, the rest clings to it, being one and continuous. It is natural that this should be so ; for it is natural for the same thing both to move something from its proper place, and to control it there when it has moved it, and for a longer time, if the holding force and the thing held become equal in power, or the holding force becomes the greater, as is true in the case under discussion ; for air is stronger in power than water.

Why are the parts of plants and animals which are 9 not actually organs, all circular—in plants the stalk and the shoots, and in animals the legs, thighs and arms, and chest ? Neither a whole limb nor any part of it is triangular or multiangular. Is it, as Archytas said, because in natural movement there is

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30 φυσικῇ ἐνεῖναι τὴν τοῦ ἴσου ἀναλογίαν (κινεῖσθαι γὰρ ἀνάλογον πάντα), ταύτην δὲ μόνην εἰς αὐτὴν ἀνακάμπτειν, ὥστε κύκλους ποιεῖν καὶ στρογγύλα, ὅταν ἐγγείνηται;

Διὰ τί ἐν τοῖς ἐσχάτοις αἰεὶ γίνεται περιφερῆ; ἢ 10 ὅτι ἡ φύσις ἐκ τῶν ἐνδεχομένων πάντα ποιεῖ ὡς δυνατὸν ἄριστα καὶ κάλλιστα, τὸ δὲ σχῆμα τοῦτο 35 κάλλιστον, τὸ αὐτὸ αὐτῷ ὁμοιότατον;

Διὰ τί, ἐὰν κύκλος ριφθῆ, τὸ μὲν πρῶτον εὐθείαν 11 γράφει, παυόμενος δὲ ἔλिका, ἕως ἂν πέσῃ; ἢ εὐθείαν μὲν τὸ πρῶτον ὅτι ὁμοίως ἐνθεν καὶ ἐνθεν 915 b ὁ ἀῆρ ἀπορθοῖ; ἴσης οὖν οὔσης τῆς ῥοπῆς ἐνθεν καὶ ἐνθεν, ἀνάγκη καὶ τὴν γραμμὴν τοιαύτην εἶναι, ἢ ἴσον διαιρεῖ τὸν τόπον ἐνθεν καὶ ἐνθεν· τοιαύτη δὲ ἐστὶν εὐθεία. ὅταν δὲ βρίσῃ ἐπὶ θάτερον μέρος δι' ἀνωμαλίαν τοῦ περισταμένου ἀέρος, οὐκέτι 5 ἴσην γράφει τό τε ἐντὸς καὶ τὸ ἐκτὸς μέρος, ἀλλ' ἀνάγκη περιφερῆ.

Διὰ τί τοῖς ἀνισον τὸ βάρος¹ ἔχουσι μεγέθεσιν, ἐὰν 12 τις κουφότερον κινῆ τῶν μερῶν, κύκλῳ περιφέρεται τὸ βαλλόμενον, οἷον τοῖς μεμολιβδωμένοις ἀστραγάλοις συμβαίνει, ἐὰν τις βάλλῃ τὸ κουφότερον 10 πρὸς αὐτὸν στρέψας μέρος; ἢ ὅτι τὸ βαρύτερον ἀδύνατον ἰσοδρομεῖν τῷ κουφοτέρῳ ἀπὸ τῆς αὐτῆς ἰσχύος ριφθέν; ἐπεὶ δὲ ἀνάγκη μὲν κινεῖσθαι, ἐξ ἴσου δὲ καὶ ἐπ' εὐθείας ἀδύνατον, ἀνάγκη εἰς τὸ ἐντὸς φερόμενον κύκλῳ φέρεσθαι· οἷον εἰ ὅλως τι ἦν αὐτοῦ ἀκίνητον διὰ βάρος ἐν μέσῳ, τὸ μὲν πρὸς 15 τῷ ἀφιέντι εἰς τὸ πρόσθεν ἂν ἐκινήθη αὐτοῦ μέρος,

¹ βάρος Forster : βάθος Ruelle.

always a proportion of equality ^a (for all things move proportionately), but this proportion is the only one which returns to itself, and so makes circles and curves, whenever possible ?

Why are objects always rounded at the edges ? Is it ¹⁰ because nature always creates objects as good and as beautiful as possible from available sources, and this shape is the most beautiful as being most consistent with itself ?

Why is it that if a circular object is thrown, it first ¹¹ describes a straight line, and as it comes to rest a spiral, until it falls ? Does it describe a straight line at first because the air supports it on one side and on the other ? So, as the balance is equal on both sides, the line described must be such that it divides the space equally on the one side and on the other ; and such a line is straight. But when it inclines to the one side owing to the inequality of pressure from the surrounding air, the inside and outside no longer describe an equal line, but it must be curved.

Why is it that with bodies of unevenly distributed ¹² weight, if one moves the lighter part of them, the body when thrown travels in a circle, as happens with loaded dice, if one throws it with the lighter side turned towards oneself ? Is it because the heavier part cannot travel at the same pace as the lighter when thrown with the same strength ? But since it must move, but cannot move in the same manner, that is, in a straight line, when it travels, it must travel in an inward direction and in a circle ; just as, if owing to the weight in the middle, part of it had been entirely motionless, the part next to the thrower would have moved forward, but the opposite side

^a If the cross section of a stalk were triangular and grew an equal amount in all directions, its shape would change.

915 b

τὸ δὲ ὑπ' ἐκεῖνα πρὸς τὸν ἀφιέντα. ἐπεὶ δὲ κινεῖται
μὲν τὸ πᾶν, ἔχει δὲ εἰ μέσῳ τὸ βάρος φερόμενον,
ἀνάγκη ταῦτο τοῦτο ποιεῖν.

Διὰ τί τὰ φερόμενα ὅταν ἀντιπέση, ἀφάλλεται 13
εἰς τοῦναντίον ἢ πέφυκεν φέρεσθαι, καὶ πρὸς ὁμοίας
20 γωνίας; ἢ ὅτι οὐ μόνον ἐκείνην φέρεται τὴν φοράν
ἣν φέρεται κατὰ τὸ οἰκεῖον μέρος, ἀλλὰ καὶ τὴν
ὑπὸ τοῦ ἀφιέντος γινομένην; ἢ μὲν οὖν οἰκεία
παύεται, ὅταν εἰς τὸν οἰκεῖον ἔλθῃ τόπον (ἅπαν γὰρ
ἡρεμῆ ἔλθόν εἰς ὃν φέρεται τόπον κατὰ φύσιν),
καθ' ἣν δ' ἔχει ἀλλοτρίαν, ἀνάγκη ἔτι κινεῖσθαι,
25 οὐκ εἰς τὸ πρόσθεν δὲ διὰ τὸ κωλύεσθαι, ἀλλ' ἢ εἰς
τὸ πλάγιον ἢ εἰς τὸ ὀρθόν. ἅπαντα δὲ ἀποπηδᾶ
πρὸς ὁμοίας γωνίας διὰ τὸ φέρεσθαι μὲν ἐνταῦθα
οὐ ἢ κίνησις φέρει, ἣν ἐποίησεν ὁ ἀφεῖς· ἐκεῖ δὲ
πρὸς ὀξείαν ἢ πρὸς ὀρθὴν φέρεσθαι συμβαίνει. ἐπεὶ
οὖν τὸ ἀντικροῦσαν κωλύει τὴν εἰς εὐθὺ κίνησιν,
30 ὁμοίως κωλύει τὸ φερόμενον καὶ τὴν φοράν αὐτοῦ.
ὥσπερ οὖν ἐν τοῖς κατόπτροις τὸ ἄκρον τῆς εὐθείας
οὐ ξυνέπεσεν ἢ ὄψις φαίνεται, καὶ ἐν τοῖς φερο-
μένοις οὕτω τὸ ἐναντίον γίνεται· τοσαύτην γὰρ
γωνίαν ἀπέωσται ὅση γίνεται ἢ κατὰ κορυφήν. δεῖ
γὰρ νοῆσαι μετακινουμένην τὴν γωνίαν καὶ τὴν
35 φοράν. τούτου δὲ γενομένου φανερόν ὅτι πρὸς
ὁμοίας γωνίας ἀνάγκη ἀφάλλεσθαι.

towards the thrower. But when the whole moves and keeps the weight in the centre as it travels, it must move in the same way.

Why do travelling bodies when they encounter an obstacle rebound in the opposite direction to that of their natural course, and at similar angles? Is it because they move not only with the impetus that belongs to them naturally, but also with that imparted to them by the thrower? For their natural movement ceases when they reach this proper position (for everything remains at rest naturally when it reaches the spot to which it is travelling), but it must still move as it has received an impulse from without, not forward because it is checked, but either sideways or at right angles. But everything recoils at similar angles because it travels to the point where the movement given it by the thrower carries it: at that point it must travel either at an acute angle or a right angle. Since then the resisting surface prevents its movement in a straight line, it equally stops both the travelling object and its impetus. As then in mirrors the image appears at the end of the straight line at the point where it falls, so in travelling bodies exactly the opposite takes place. For they rebound at an angle equal to that of the apex of the triangle. For we must note that both the angle and the cause of the impetus are changed. In these circumstances it is evident that bodies must rebound at similar angles.

ΙΖ

ΟΣΑ ΠΕΡΙ ΕΜΨΥΧΑ

915 b

Διὰ τί οἱ ἀσύμμετροι παρ' ἀλλήλους θεωρούμενοι 1
 μείζους φαίνονται ἢ καθ' αὐτοὺς μόνους; ἢ ὅτι τὸ
 916 a σύμμετρόν ἐστιν ἓν, καὶ ἡ συμμετρία ὅτι μάλιστα
 εἰ ποιεῖ, τὸ δὲ ἓν ἀδιαίρετον βούλεται εἶναι, τὸ δὲ
 ἀδιαίρετον ἔλαττόν ἐστιν, ἢ δὲ ἀσυμμετρία κατὰ
 τὴν διαφορὰν πολλὰ ποιεῖ; καθ' αὐτὰ μὲν οὖν
 θεωρούμενα μᾶλλον λανθάνει ποῖα ἅττα τὰ μεγέθη
 ἐστίν, παρ' ἄλληλα δὲ οὐ. τὸ μὲν οὖν ἀδιαίρετον
 ἐν φαίνεται, καὶ ἡ θεωρία μία ἐστὶν αὐτοῦ διὰ τὴν
 συμμετρίαν· τὸ δὲ ἀσύμμετρον ὡς πολλὰ ὄν θεωρίαν
 ποιεῖ πλείω, καὶ μείζω φαίνεται τῷ ἓν ὄν πολλὰ
 φαίνεσθαι· ἔχει γὰρ τὴν τε τοῦ μεγέθους κατὰ τὴν
 10 συνέχειαν φύσιν, καὶ τὴν τοῦ ἀριθμοῦ κατὰ τὸ
 ἀνώμαλον τῶν μερῶν, διόπερ εἰκότως τὴν ἐξ ἀμφοῖν
 αὐξὴν ἔχον μείζον φαίνεται παρὰ τὸ ἀπλοῦν καὶ ἓν.

Διὰ τί ἐπὶ μῆκος μᾶλλον τὰ ζῶα καὶ τὰ φυτὰ 2
 φύεται; ἢ ὅτι τὸ μῆκος μὲν τρεῖς αὐξεται, τὸ δὲ
 πλάτος δῖς, τὸ δὲ βάθος ἅπαξ; ἔστι γὰρ μῆκος τὸ
 15 ἀπὸ τῆς ἀρχῆς πρῶτον, ὥστε μόνον τε αὐξεται, καὶ
 ἅμα τῷ πλάτει πάλιν γινόμενον, καὶ τρίτον ἅμα τῷ

BOOK XVII

PROBLEMS CONNECTED WITH ANIMATE OBJECTS

Why do the asymmetrical look larger when standing by the side of others, than when they stand alone? Is it because symmetry implies unity, and to the greatest extent produces unity, but unity is indivisible, and the indivisible is smaller? Asymmetry, on the other hand, produces a multiplicity by causing a diversity. So when objects are seen alone, their respective sizes are not noticed, but when placed with others, they are. So what is indivisible appears a unit, and because of its symmetry the impression it makes is one; but the asymmetrical being in fact plural makes the impression of plurality, and it seems greater because though really one it appears to be many. Because of its continuity it has the nature of size, and because of the inequality of its parts it has the nature of a number, so that naturally having an increase from both these characteristics it seems larger in comparison with the simple unit.

Why do both plants and animals grow most in the direction of their length? Is it because increase in length is triple, in breadth double and in depth single? For length is the first and original measurement, so that it increases first by itself, secondly at the same time as breadth, and thirdly at the same time as

916^a βάθει. τὸ δὲ πλάτος δῖς, καθ' ἑαυτό τε καὶ ἅμα τῷ βάθει.¹

Πῶς τὸ πρότερον καὶ τὸ ὕστερον δεῖ λαβεῖν; 3
 πρότερον ὡσπερ ἡμῶν οἱ ἐπὶ Τροίας καὶ ἐκείνων οἱ
 20 πρὸ αὐτῶν καὶ αἰεὶ οἱ ἐπάνω πρότεροί εἰσιν; ἢ
 εἴπερ ἀρχὴ τίς ἐστὶν καὶ μέσον καὶ τέλος τοῦ
 παιτός, καὶ ὅταν γηράσκων τις ἐπὶ τὸ πέρασ ἔλθῃ
 καὶ πάλιν ἐπαναστρέψῃ ἐπὶ τὴν ἀρχήν, τὰ δὲ ἐγ-
 γυτέρω τῆς ἀρχῆς πρότερα, τί κωλύει ἡμᾶς ἐν τῷ
 25 πρότεροι εἶημεν. ὡσπερ ἐπὶ τοῦ οὐρανοῦ καὶ ἐκά-
 στου τῶν ἄστρον φορᾶ κύκλος τίς ἐστὶν, τί κωλύει
 καὶ τὴν γένεσιν καὶ τὴν ἀπώλειαν τῶν φθαρτῶν
 τοιαύτην εἶναι, ὥστε πάλιν ταῦτα γίνεσθαι καὶ
 φθείρεσθαι; καθάπερ καὶ φασὶ κύκλον εἶναι τὰ
 ἀνθρώπινα. τὸ μὲν δὴ τῷ ἀριθμῷ τοὺς αὐτοὺς
 30 ἀξιοῦν εἶναι αἰεὶ τοὺς γινομένους εὐήθεις, τὸ δὲ τῷ
 εἶδει μᾶλλον ἂν τις ἀποδέξαιτο· ὥστε καὶ αὐτοὶ
 πρότεροι εἶημεν, καὶ θείῃ ἂν τις τὴν τοῦ εἴρμου
 τάξιν τοιαύτην εἶναι, ὡς πάλιν ἐπανακάμπτειν ἐπὶ
 τὴν ἀρχὴν καὶ συνεχὲς ποιεῖν καὶ αἰεὶ κατὰ ταῦτα
 ἔχειν. τοὺς γὰρ ἀνθρώπους φησὶν Ἀλκμαίων διὰ
 35 τοῦτο ἀπόλλυσθαι, ὅτι οὐ δύνανται τὴν ἀρχὴν τῷ
 τέλει προσάψαι, κομψῶς εἰρηκῶς, εἴ τις ὡς τύπῳ
 φράζοντος αὐτοῦ ἀποδέχοιτο καὶ μὴ διακριβοῦν
 ἐθέλοι τὸ λεχθέν. εἰ δὴ κύκλος ἐστίν, τοῦ δὲ κύ-
 κλου μήτε ἀρχὴ μήτε πέρασ, οὐδ' ἂν πρότεροι εἶεν
 τῷ ἐγγυτέρω τῆς ἀρχῆς εἶναι, οὐθ' ἡμεῖς ἐκείνων
 οὐτ' ἐκεῖνοι ἡμῶν.

¹ βάθει Bonitz : μεγέθει Ruelle.

depth. But breadth has a double increase, by itself and at the same time as depth.

How should one define the terms "before" and "after"? Should it be in the sense that the people of Troy are before us, and those previous to them before them and so on continuously? Or if it is true that the universe has a beginning, a middle and an end, and when a man grows old he reaches his limit and reverts again to the beginning, and those things which are nearer the beginning merit the term "before," what is there to prevent us from regarding ourselves as nearer the beginning? If that is true, then we should be "before." As therefore in the movement of the heavens and of each star there is a circle, what is there to prevent the birth and death of perishable things from being of this nature, so they are born and destroyed again? So they say that human affairs are a cycle. The suggestion that those who are continually being born are numerically identical is absurd, but we could accept that they are the same in "form." In that sense we should be "before," and we should assume the arrangement of the series to be of the type which returns to the starting-point and produces continuity and is always acting in the same way. For Alcmaeon tells us that men die because they cannot connect the beginning with the end—a clever saying, if one supposes him to be speaking in metaphor, and not to wish his words to be taken literally. If, then, there is a circle, and a circle has neither beginning nor end, men would not be "before" because they are nearer the beginning, nor should we be "before" them, nor they "before" us.

ΙΗ

916 b

ΘΣΑ ΠΕΡΙ ΦΙΛΟΛΟΓΙΑΝ

Διὰ τί τοὺς μὲν, εἰάν ἄρξωνται ἀναγινώσκειν, ὕπνος λαμβάνει καὶ μὴ βουλομένους, τοὺς δὲ βουλομένους ποιεῖ ἐγρηγορέναι,¹ ὅταν λάβωσι τὸ βιβλίον * * * ; ἢ ὅσοις μὲν εἰσι πνευματικαὶ κινήσεις διὰ ψυχρότητα φύσεως ἢ μελαγχολικῶν χυμῶν, δι' οὓς περίπτωμα γίνεται πνευματικὸν ἄπεπτον διὰ ψυχρότητα, τούτοις ὅταν μὲν κινήται ἡ διάνοια καὶ μὴ νοήση ἐπιστήσασά τι, ἐκκρούεται τῇ ἑτέρᾳ κινήσει οὕσῃ καταψυκτικῇ, διὸ μᾶλλον καθεύδουσιν; ὅταν δὲ ἐρείσωσι πρὸς τι ἐν τῇ διανοίᾳ, ὅπερ ἡ ἀνάγνωσις ποιεῖ, κινουῦνται ὑπὸ τῆς θερμαντικῆς κινήσεως οὐκ ἐκκρουομένης ὑπ' οὐδενός, ὥστε οὐ δύνανται καθεύδειν. τῶν δὲ κατὰ φύσιν ἐχόντων ὅταν στήῃ πρὸς ἐν ἡ διάνοια καὶ μὴ μεταβάλλῃ πολλαχῇ ἰσχυροτάτῃ οὕσα, ἴσχεται καὶ τὰ ἄλλα ὅσα ἐστὶ περὶ τὸν τόπον τοῦτον, ὧν ἡρέμησις ὁ ὕπνος ἐστίν. ὅταν δὲ στήῃ καὶ οἶον κοπιάσῃ ὁ νοῦς, βαρύνει τὴν κεφαλὴν ὧν ἐν αὐτῇ καὶ ποιεῖ τὸν ὕπνον. κινουμένης δὲ τῆς ψυχῆς κατὰ φύσιν οὐ καθεύδει· ζῆν γὰρ τότε μάλιστα. τὸ δ' ἐγρηγορέναι τοῦ ζῆν αἰτιὸν ἐστὶν ἢ τὸ καθεύδειν.

¹ ποιεῖ ἐγρηγορέναι Bussemaker : προεγρηγορέναι MS.

BOOK XVIII

PROBLEMS CONNECTED WITH STUDIOUSNESS

WHY is it that in some cases, if men begin to read, they are attacked by sleep against their will, and that it makes others keep awake, even if they want to sleep, when they take a book? Is it because in those in whom movements of breath take place owing to a coldness which is either natural or due to melancholic humours, owing to which the waste product of breathing is unconcocted because of the coldness, in such men, when the mind is stirred but does not think with concentration, it is vanquished by the other movement which has a cooling effect, so that they are more inclined to sleep? But when they concentrate on something in their mind, which is the state induced by reading, they are moved by a warming movement, which is unchecked by anything, so that they cannot sleep. But in those who are in a natural state when the mind concentrates on one subject and being very strong does not change in many directions, all the other activities in the region where the mind is are stationary, and their immobility is sleep, and when the mind is stationary and as it were tired, being in the head, it weighs it down and produces sleep. When the soul moves naturally it does not sleep; for then it is particularly alive. But wakefulness is the cause of life rather than sleep.

916^b
20 Διὰ τί οἱ ἐριστικοὶ λόγοι γυμναστικοί εἰσιν; ἢ 2
ὅτι ἔχουσι τὸ νικᾶν ἢ ἡττᾶσθαι πυκνόν; φιλο-
νείκους οὖν εὐθύς ποιοῦσιν· καὶ γὰρ νικῶντες διὰ
τὸ χαίρειν προάγονται μᾶλλον ἐρίζειν καὶ ἡττώ-
μενοι ὡς ἀναμαχοῦμενοι. καὶ οἱ ἐν τοῖς ἄλλοις
ἀγῶσι ταῦτό· διὸ καὶ μαχόμενοι καὶ ἡττους ὄντες
25 πολλάκις οὐ βούλονται διαλύεσθαι.

Διὰ τί τοῖς παραδείγμασι χαίρουσιν οἱ ἄνθρωποι 3
ἐν ταῖς ῥητορείαις καὶ τοῖς λόγοις μᾶλλον τῶν
ἐνθυμημάτων; ἢ ὅτι τῷ τε μανθάνειν χαίρουσι
καὶ τῷ ταχύ; ῥᾶον δὲ διὰ τῶν παραδειγμάτων καὶ
30 τῶν λόγων μανθάνουσιν· ἃ γὰρ ἴσασιν, ἔστι ταῦτα
καὶ ἐπὶ μέρους, τὰ δὲ ἐνθυμήματα ἀπόδειξις ἐστίν
ἐκ τῶν καθόλου, ἃ ἡττον ἴσμεν ἢ τὰ μέρη. ἔτι οἷς
ἂν μαρτυρῶσι πλείους, μᾶλλον πιστεύομεν, τὰ δὲ
παραδείγματα καὶ οἱ λόγοι μαρτυρίαις εἰκόασιν·
αἱ δὲ διὰ τῶν μαρτύρων ῥᾶδιοι πίστεις. ἔτι τὸ
35 ὅμοιον μανθάνουσιν ἡδέως, τὸ δὲ παράδειγμα καὶ
οἱ μῦθοι τὸ ὅμοιον δεικνύουσιν.

Διὰ τί ῥήτορα μὲν καὶ στρατηγὸν καὶ χρημα- 4
τιστὴν λέγομεν δεινόν, αὐλητὴν δὲ καὶ ὑποκριτὴν
οὐ λέγομεν; ἢ ὅτι τῶν μὲν ἡ δύναμις ἄνευ πλεον-
εξίας (ἡδονῆς γὰρ στοχαστικὴ ἐστίν), τῶν δὲ πρὸς
917^a τὸ πλεονεκτεῖν; ῥήτωρ γὰρ καὶ στρατηγὸς καὶ
χρηματιστὴς ἀγαθός ἐστίν ὁ δυνάμενος πλεόν ἔχειν,
ἢ δὲ δεινότης μάλιστα ἐν τῷ πλεονεκτεῖν ἐστίν.

Διὰ τί τὸν φιλόσοφον τοῦ ῥήτορος οἴονται δια- 5
φέρειν; ἢ ὅτι ὁ μὲν τί ἐστίν ἀδικία, ὁ δὲ ὡς
370

Why are discussions good training for the mind? 2
Is it because they involve frequent victories and defeats? So they immediately make us contentious; for, if we win, because of our delight we are induced to compete again, and if we are defeated we wish to renew the fight. The same thing is true of other contests; so when we fight and are being defeated we often are unwilling to end the struggle.

Why is it that men prefer examples in speeches 3 and tales rather than enthymemes? Is it because they enjoy learning and learning quickly? And they learn more easily by examples and tales; for what they learn in this way is an individual fact, but enthymemes are a demonstration based on generalities, which are less familiar than individual facts. Moreover, we are more ready to believe in facts for which many bear witness, and examples and tales resemble evidence; also proofs supported by evidence are easy to obtain. Again men gladly learn of similarities, and examples and tales display similarities.

Why do we describe an orator, a general or a 4 business man as astute, but do not apply the term to the musician or the actor? Is it because the power of the latter has no connexion with advantage (for it only aims at giving pleasure), but the power of the former aims at advantage? For the orator, the general and the business man are good if they are able to get the better of someone, and astuteness is especially shown in getting the better.

Why do we regard the philosopher as a better 5 man than the orator? Is it because the former discusses the question what is injustice, while the latter

917^a 5 ἄδικος ὁ δεῖνα, καὶ ὁ μὲν ὅτι τύραννος, ὁ δὲ οἶον ἢ τυραννίς;

Διὰ τί, ἅπερ ἂν τινες προέλωνται, ἐνδιατρίβουσι 6
τούτοις ἐνίοτε φαύλοις οὔσι μᾶλλον ἢ ἐν τοῖς
σπουδαιοτέροις; οἶον θαυματοποιὸς ἢ μῖμος ἢ
συρικτῆς μᾶλλον ἢ ἀστρονόμος ἢ ῥήτωρ εἶναι ἂν
10 βούλοιτο ὁ ταῦτα προελόμενος. ἢ ὅτι βούλονται
μὲν ἐνιοὶ τὰ σπουδαιότατα μεταχειρίζεσθαι, διὰ δὲ
τὸ μὴ πιστεύειν ἑαυτοῖς ὡς δυνησομένοις, διὰ τοῦτο
οὐ πράττουσιν; ἢ ὅτι ἐν οἷς οἴεται ἕκαστος κρατι-
στεύειν, ταῦτα προαιρεῖται; ὁ δὲ αἰρεῖται, καὶ ἐπὶ
τοῦτ' ἐπείξεται, νέμων τὸ πλείστον ἡμέρας αὐτῷ
μέρος, ἵνα αὐτὸς αὐτοῦ τυγχάνῃ κράτιστος ὢν.
15 ὅ τι δὲ ἂν τινες ἐξ ἀρχῆς προέλωνται καὶ οἷς ἂν
συνεθισθῶσιν, οὐδὲ κρίνειν ἔτι δύνανται τὰ βελτίω·
διέφθαρται γὰρ ἢ διάνοια διὰ φαύλας προαιρέσεις.

Διὰ τί τοὺς μὲν, ἂν ἄρξωνται ἀναγινώσκειν, 7
ὑπνος λαμβάνει καὶ μὴ βουλομένους, τοὺς δὲ βου-
20 λομένους οὐ ποιεῖ¹ δύνασθαι, ὅταν λάβωσι βιβλίον;
ἢ ὅσοις μὲν εἰσι πνευματικαὶ κινήσεις διὰ ψυχρό-
τητα φύσεως ἢ μελαγχολικῶν χυμῶν, δι' οὓς
περίπτωμα γίνεται πνευματικὸν ἄπεπτον διὰ ψυχρό-
τητα, τούτοις ὅταν μὲν κινήται ἢ διάνοια καὶ μὴ
νοῆ ἐπιστήσασά τι, ἐκκρούεται ἢ ἑτέρα κίνησις,
25 διὸ μᾶλλον μεταβάλλοντες πολὺ τὴν διάνοιαν καθ-
εύδουσιν; ἠττᾶται γὰρ ἢ πνευματικῆ. ὅταν δὲ
ἐρείσῃσι πρὸς τι τὴν διάνοιαν, ὅπερ ἢ ἀνάγνωσις
ποιεῖ, κινουῦνται ὑπὸ τῆς πνευματικῆς κινήσεως,

¹ This emendation of W. D. Ross for the ms. τοὺς δὲ οὐ βουλομένους is made certain by Problem 1.

only shows that so-and-so is unjust, and the orator shows that a man is a tyrant, the philosopher discusses what is tyranny?

Why is it that men sometimes spend their time in inferior pursuits which they have chosen rather than more important ones? The man who has chosen these things would rather be, for instance, a conjurer, an actor or a piper than an astronomer or an orator. Is it because some men would prefer to take the most important tasks, but do not do so because they have no trust in their ability to do so? Or is it because each chooses the task in which he thinks he can excel? So he makes his choice and is enthusiastic about it, spending most of the day on it, in order that he may surpass himself in excellence. But when men have chosen one pursuit at the outset and have accustomed themselves to it, they can no longer judge what is best, for their mind has been corrupted by their bad choice.

Why if men start to read does sleep overcome them? even against their will, and yet makes others unable to sleep, when they take a book? Is it because in those in whom there are movements of breath owing to the coldness of their nature or their melancholic humours, as a result of which the waste product of the breath is unconcocted because of the coldness—in their case when the mind moves and does not think of anything in a concentrated fashion, the other movement is checked, so they undergo a great mental change and go to sleep (for the movement of their breath is overpowered). But when they fix their mind on a subject, which reading causes them to do, they are stirred by the movement of breath, which is not

917 a

οὐκ ἐκκρουομένης ὑπ' οὐδενός, ὥστε οὐ δύνανται
καθεύδειν. τῶν δὲ κατὰ φύσιν ἐχόντων ὅταν στή
30 πρὸς ἓν ἢ διάνοια καὶ μὴ μεταβάλλῃ πολλαχῆ,
ἴσταται καὶ τὰ ἄλλα ὅσα περὶ τὸν τόπον, ὧν
ἡρέμησις ὁ ὕπνος ἐστίν. ἐνὸς γὰρ κυρίου στάντος,
ὥσπερ ἐν τροπῇ, καὶ τὰ ἄλλα μόρια ἴστασθαι
πέφυκεν. φύσει γὰρ ἄνω τὸ κοῦφον φέρεται, τὸ δὲ
βαρὺ κάτω. ὅταν οὖν ἡ ψυχὴ κινήται κατὰ φύσιν,
35 οὐ καθεύδει· ζῆ γὰρ τότε μάλιστα.¹ ὅταν δὲ στή
καὶ οἶον κοπιάσῃ, ὁ μὲν νοῦς μεταβάλλει, καὶ ἄνω
τὰ σωματώδη πρὸς τὴν κεφαλὴν ἰόντα ποιεῖ τὸν
ὕπνον. δόξειε δ' ἂν ἢ ἀνάγνωσις κωλύειν καθ-
εύδειν. ἔστι δὲ οὐ διὰ τὸ νοεῖν (ὠρισταί γὰρ τότε
μᾶλλον ἢ ψυχῇ), ἀλλὰ διὰ τὸ μεταβάλλειν ἢ
917 b ἀγρυπνία, ἐπεὶ καὶ νοήσεις αἱ τοιαῦται ἀγρυπνοί-
εῖσιν, ἐν αἷς ζητεῖ ἡ ψυχὴ καὶ ἀπορεῖ, ἀλλ' οὐκ ἐν
αἷς αἰεὶ θεωρεῖ· ἐκεῖναι μὲν γὰρ ἀοριστεῖν ποιοῦσιν,
αὐταὶ δὲ οὔ.

Διὰ τί ἐν τοῖς ἐριστικοῖς οὐκ ἔνεστιν ἀδολεσχία;
5 ἢ ὅτι συλλογισμὸς ἐστὶ φαινόμενος, ἐν ὀλίγοις δὲ
ὁ συλλογισμὸς; καὶ ἐὰν μηκύνῃ, χρόνου γινομένου
ὁ παραλογισμὸς δῆλος, καὶ ἔστιν ὃ ἔδωκεν ἀνα-
λαβεῖν.

Διὰ τί ποτε τῶν ἱστοριῶν ἡδῖον ἀκούομεν τῶν
περὶ ἓν συνεστηκυῖων ἢ τῶν περὶ πολλὰ πεπραγ-
10 ματευμένων; ἢ διότι τοῖς γνωριμωτέροις μᾶλλον
προσέχομεν καὶ ἡδῖον αὐτῶν ἀκούομεν; γνωριμώ-
τερον δὲ ἐστὶ τὸ ὠρισμένον τοῦ ἀορίστου. τὸ μὲν
οὖν ἐν ὠρισταί, τὰ δὲ πολλὰ τοῦ ἀπείρου μετέχει.

Διὰ τί ἡδόμεθα ἀκούοντες τὰ μήτε λίαν παλαιὰ

¹ οὕτω γὰρ ἔχει Kuelle, which is nonsense. The reading in the text is taken from 916 b 18.

PROBLEMS, XVIII. 7-10

checked by anything, so that they cannot sleep. But with those who are in a natural state, when the mind concentrates on one thing and does not shift in many directions, everything else in that region stands still, and their immobility is sleep. For when a single leader halts, as we see in a rout, the other units naturally halt also. For by nature the light travels upwards, and the heavy downwards. When the soul moves in a natural way, it does not sleep: for then it is most alive; but when it stands still and is as it were weary, the mind undergoes change, and the bodily elements mounting to the head cause sleep. Reading, then, might seem to prevent sleep, but sleeplessness is due not to thinking (for then the mind is more concentrated) but to a state of change, for the intellectual activities which cause wakefulness are those in which the mind seeks and questions, and not those in which it is continuously contemplative: for the former cause a lack of concentration, but the latter do not.

Why is there no trifling in contentious argument? 8
Is it because contentious argument must be a syllogism, and a syllogism is comprised in a few words? 8
If it continues, the fallacy becomes obvious after a short time and it is possible to withdraw concessions already made. 9

Why do we enjoy listening to accounts of a single 9
episode more than to those which deal with many? 9
Is it because we pay greater attention to more comprehensible subjects and listen to them with greater pleasure? But that which is limited in time is better known than the unlimited. And the single thing is limited, but a plurality partakes of the unlimited. 10

Why do we enjoy hearing of events which are 10

ARISTOTLE

917 b

μήτε κομιδῇ νέα; ἢ διότι τοῖς μὲν πόρρω ἀφ'
15 ἡμῶν ἀπιστοῦμεν, ἐφ' οἷς δὲ ἀπιστοῦμεν οὐχ
ἠδόμεθα, τὰ δὲ ὥσπερ ἔτι αἰσθανόμεθα, καὶ περὶ
τούτων ἀκούοντες οὐχ ἠδόμεθα;

PROBLEMS, XVIII. 10

neither very old nor quite new? Is it because we disbelieve what is far away from us, and we do not enjoy what we disbelieve, but the present is still as it were within our observation and we do not enjoy hearing of it?

ΟΣΑ ΠΕΡΙ ΑΡΜΟΝΙΑΝ

Διὰ τί οἱ πονοῦντες καὶ οἱ ἀπολαύοντες αὐ- 1
 20 λοῦνται; ἢ ἵνα οἱ μὲν ἤττον λυπῶνται, οἱ δὲ
 μᾶλλον χαίρωσιν;

Διὰ τί πορρωτέρω ὁ αὐτὸς τῇ αὐτῇ φωνῇ γεγωνεῖ 2
 μετ' ἄλλων ἄδων καὶ βοῶν ἢ μόνος; ἢ ὅτι τὸ
 ἀθρώως τι ποιεῖν ἢ θλίβειν ἢ ὠθεῖν οὐ τοσαυτα-
 πλάσιόν ἐστιν ὅσος ὁ ἀριθμός, ἀλλ' ὥσπερ ἡ
 25 γραμμὴ ἢ δίπους οὐ διπλάσιον ἀλλὰ τετραπλάσιόν
 τι γράφει, οὕτως τὰ συντιθέμενα πλέον ἰσχύει κατὰ
 τὸν ἀριθμὸν ἢ ὅταν ἦ διηρημένα; ἀθρώων οὖν
 ὄντων μία γίνεται ἢ τῆς φωνῆς ἰσχύς καὶ ἅμα ὠθεῖ
 τὸν ἀέρα, ὥστε πολλαπλάσιον προῖέναι· καὶ γὰρ
 ἡ ἐκ πάντων φωνῇ μιᾶς ἐκάστης πολλαπλάσιος.

^a The author evidently means that a collective voice production has a greater effect than the sum of the vocal production of each taken separately.

^b The line in question may be a radius. The area of a circle of one foot radius is approximately $3\frac{1}{7}$ square feet. The area of a circle of two foot radius is nearly $12\frac{1}{7}$ square feet: but the line may also be that on which a square is described,

BOOK XIX

PROBLEMS CONNECTED WITH HARMONY

WHY do those who are sad and those who are enjoying themselves both have the flute played to them? Is it because the latter class hope to lessen their grief, and the former to increase their pleasure?

Why does the same person with the same voice make himself heard at a greater distance when he sings or shouts with others than when he is alone? Is it because to do anything collectively—for instance pressing or pushing—does not produce an effect merely proportioned to the number of the agents; for instance a line two feet long does not describe a figure twice but four times the size of that described by a line one foot long? In the same way forces when united are bigger in proportion to their number than when they are separate. So when many people sing together, the force of their voice unites and pushes the air all at once in such a way that it travels many times farther; for the voice proceeding from all is much greater than the sum of all voices separately.

for the square on a one foot line is one square foot and on a two foot line is 4 square feet. In either case the simile is geometrical.

917^b
30 Διὰ τί τὴν παρυπάτην ἄδοντες μάλιστα ἀπορρή-
γνυνται, οὐχ ἦττον ἢ τὴν νήτην καὶ τὰ ἄνω, μετὰ
δὲ διαστάσεως πλείονος; ἢ ὅτι χαλεπώτατα
ταύτην ἄδουσι, καὶ αὕτη ἀρχή; τὸ δὲ χαλεπὸν διὰ
τὴν ἐπίτασιν καὶ πίεσιν τῆς φωνῆς· ἐν τούτοις δὲ
πόνος· πονοῦντα δὲ μᾶλλον διαφθείρεται.

35 Διὰ τί δὲ ταύτην χαλεπῶς, τὴν δὲ ὑπάτην ῥαδίως;
καίτοι δίεσις ἑκατέρας. ἢ ὅτι μετ' ἀνέσεως ἢ
ὑπάτη, καὶ ἅμα μετὰ τὴν σύντασιν ἐλαφρὸν τὸ ἄνω
βάλλειν; διὰ ταῦτό δὲ ἔοικεν καὶ τὰ πρὸς μίαν
λεγόμενα πρὸς ταύτην ἢ παρανήτην. δεῖ γὰρ μετὰ
918^a συννοίας καὶ καταστάσεως οἰκειοτάτης τῷ ἦθει
πρὸς τὴν βούλησιν. τοῦ δὲ δὴ μετὰ συμφωνίας
τίς ἢ αἰτία;

Διὰ τί ἦδιον ἀκούουσιν ἀδόντων ὅσα ἂν προ-
επιστάμενοι τυγχάνωσι τῶν μελῶν, ἢ ὧν μὴ ἐπ-
5 ίστανται; πότερον ὅτι μᾶλλον δῆλος ὁ τυγχάνων ὥσ-
περ σκοποῦ, ὅταν γνωρίζωσι τὸ ἀδόμενον; τοῦτο
δὲ ἦδὺ θεωρεῖν. ἢ ὅτι <τὸ θεωρεῖν μᾶλλον> ἦδὺ <ἦ>¹
τὸ μαθάνειν; τούτου δὲ αἴτιον ὅτι τὸ μὲν λαμ-

¹ <τὸ θεωρεῖν μᾶλλον> . . . <ἦ> inserted by Bonitz.

^a Cf. *De An.* 804 b 11, where the word is explained as
“the sound made by the voice when there is no longer strength
enough to expel the breath with force.”

The notes of the octave beginning at the lowest are hypate,
parhypate, lichanos, mese, paramese, trite, paranete, nete.
This passage must mean singing the interval from hypate to
parhypate, for there can be no *special* difficulty attached to
the singing of any note.

If this translation is correct, which is uncertain, Aristotle
must be referring to the enharmonic scale in which the interval

PROBLEMS, XIX. 3-5

3 Why is it that men's voices quaver most when 3
singing parhypate ^a no less than when they sing the
nete and the higher notes, though the interval in the
latter case is greater? Is it because they find it most
difficult to sing this interval, which is the first interval
in the scale? The difficulty is due to the straining
and compression of the voice; both these require an
effort, and since they require an effort, they are more
4 likely to fail.

But why is the ascent to the parhypate difficult, 4
when the descent to the hypate is easy? Yet in each
case the interval is a quarter tone. Is it because the
descent to the hypate involves a relaxation, and after
strain it is easy to relax? [For the same reason what
is said of a unison chord must apply either to it or to
paranete. For one must proceed with caution and
by following a sequence entirely appropriate to the
5 moral character of the piece and the intention (of
the composer.) What, then, is the cause of a tune
composed in concordance?] ^b

^c Why do we listen with greater pleasure to men 5
singing music which we happen to know beforehand,
than to music which we do not know? Is it because,
when we can recognize the song, the attainment as
it were of his aim by the singer is more obvious?
This is pleasant to contemplate. Or is it because
it is more pleasant to contemplate than to learn?
The reason is that in the one case it is the acquisition
between hypate and parhypate is a quarter tone—admittedly
most difficult to sing. This interpretation is supported by the
next problem.

^b The whole of this passage must be either corrupt or out
of place. As it stands it is for the most part meaningless,
nor will any possible emendation make it satisfactory.

^c Cf. Problem 40.

βάνειν τὴν ἐπιστήμην, τὸ δὲ χρῆσθαι καὶ ἀναγνω-
ρίζειν ἐστίν. ἔτι καὶ τὸ σύνηθες ἢ δὴ μᾶλλον τοῦ
ἀσυνήθους.

10 Διὰ τί ἢ παρακαταλογῆ ἐν ταῖς ὤδαῖς τραγικόν; 6
ἢ διὰ τὴν ἀνωμαλίαν; παθητικὸν γὰρ τὸ ἀνωμαλὲς
καὶ ἐν μεγέθει τύχης ἢ λύπης, τὸ δὲ ὀμαλὲς ἔλαττον
γοῶδες.

Διὰ τί οἱ ἀρχαῖοι ἐπταχόρδους ποιοῦντες ἀρμονίας 7
τὴν ὑπάτην, ἀλλ' οὐ τὴν νήτην κατέλιπον; πότερον
15 τοῦτο ψεῦδος (ἀμφοτέρας γὰρ κατέλιπον, τὴν δὲ
τρίτην ἐξήρουν); ἢ οὐκ [ἀλλ'] ὅτι ἢ βαρυτέρα ἴσχει
τὸν τῆς ὀξύτερας φθόγγον, ὥστε μᾶλλον ἢ ὑπάτη
ἀπεδίδου τὸ ἀντίφωνον ἢ ἢ νήτη, ἐπεὶ τὸ ὀξύ
δυνάμεως (σημεῖον) μᾶλλον, τὸ δὲ βαρὺ ῥᾶον
φθέγγασθαι.

Διὰ τί ἢ βαρεῖα τὸν τῆς ὀξείας ἴσχει φθόγγον; 8
20 ἢ ὅτι μεῖζον τὸ βαρὺ; τῇ γὰρ ἀμβλεία ἔοικεν, τὸ
δὲ (ὀξύ) τῇ ὀξείᾳ γωνία.

Διὰ τί ἢ ἴδιον τῆς μονωδίας ἀκούομεν, εἴαν τις 9
πρὸς αὐλὸν ἢ λύραν ἄδῃ; καίτοι πρόσχορδα καὶ
τὸ αὐτὸ μέλος ἄδουσιν ἀμφοτέρως· εἰ γὰρ ἔτι
25 μᾶλλον τὸ αὐτό, πλέον ἔδει πρὸς πολλοὺς αὐλητὰς
καὶ ἔτι ἢ ἴδιον εἶναι. ἢ ὅτι τυγχάνων δῆλος τοῦ
σκοποῦ μᾶλλον, ὅταν πρὸς αὐλὸν ἢ λύραν; τὸ δὲ

^a For the meaning of hypate *cf.* note on Problem 3. There seems a confusion of thought here. The heptachord was older than the octachord, and it would therefore be more true to say that ancient musicians *added* nete when they made an eight-note scale. They may, however, have played an octave on seven strings which would have involved omitting one of the intermediate notes.

PROBLEMS, XIX. 5-9

of knowledge, but in the other it is using it and a form of recognition. Moreover, what we are accustomed to is always more pleasant than the unfamiliar.

Why does recitative in singing produce a tragic ⁶ effect? Is it due to contrast? For in a situation of extreme calamity or grief, contrast produces pathos, while uniformity is less mournful.

Why did the ancients when they made the seven- ⁷ note scales leave in the hypate and not the nete? ^a Is this account untrue (on the ground that they left both in and cut out trite), and is not the true explanation that the lower note contains the sound of the higher note, so that hypate gives the octave better than nete, since the high note is a proof ^b of power, and a low note is easier to sing?

Why does the low note contain ^c the sound of the ⁸ high note? Is it because the low note is greater? It is like an obtuse angle whereas the high note is like an acute angle.

Why do we listen with greater pleasure to a solo, if ⁹ it is sung to the accompaniment of one flute or one lyre (than to the accompaniment of a large orchestra)? ^d Yet in both cases they sing identically the same song to the accompaniment of strings. For if we have the same thing in larger quantity, it ought, when accompanied by a number of flute-players, to be still more pleasant. Is it because when he sings to one flute or lyre it is obvious that the singer is reaching his aim? The accompaniment, then, of a

^b The word "proof" which is missing from all mss. is supplied from the same phrase in Problem 37.

^c Accepting the same emendation as in Problem 7 to which this must refer.

^d These words must be supplied in order to make sense.

918 a

πρὸς πολλοὺς αὐλητὰς ἢ λύρας πολλὰς οὐχ ἥδιον,
ὅτι ἀφανίζει τὴν ᾠδὴν.

30 Διὰ τί, εἰ ἡδίων ἢ ἀνθρώπου φωνή, ἢ ἄνευ λόγου 10
ἄδοντος οὐχ ἡδίων ἐστίν, οἷον τερετιζόντων, ἀλλ'
αὐλὸς ἢ λύρα; ἢ οὐδ' ἐκεῖ, εἰ μὴ μιμῆται,
ὁμοίως ἡδύ; οὐ μὴν ἀλλὰ καὶ διὰ τὸ ἔργον αὐτό.
ἢ μὲν γὰρ φωνή ἡδίων ἢ τοῦ ἀνθρώπου, κρου-
στικὰ δὲ μᾶλλον τὰ ὄργανα τοῦ στόματος. διὸ
ἡδιον ἀκούειν ἢ τερετίζειν.

35 Διὰ τί ἢ ἀπηχοῦσα ὀξυτέρα; ἢ ὅτι ἔλαττον, 11
ἀσθενεστέρα γινομένη;

Διὰ τί τῶν χορδῶν ἢ βαρυτέρα αἰεὶ τὸ μέλος λαμ- 12
βάνει; ἂν γὰρ εἰς τὴν παραμέσσην δέον συμψηλαί
τῇ μέσση, γίνεται τὸ μέλος οὐθὲν ἡττον· εἰ δὲ
40 τὴν μέσσην, δέον ἄμφω ψηλαί, οὐ γίνεται.¹ ἢ ὅτι
918 b τὸ βαρὺ μέγα ἐστίν, ὥστε κρατερόν; καὶ ἔνεστιν
ἐν τῷ μεγάλῳ τὸ μικρόν· καὶ τῇ διαλήψει δύο
νῆται ἐν τῇ ὑπάτῃ γίνονται.

Διὰ τί ἐν τῇ διὰ πασῶν τοῦ μὲν ὀξέος ἀντίφωνον 13
γίνεται τὸ βαρὺ, τούτου δὲ τὸ ὀξὺ οὐ; ἢ ὅτι
5 μάλιστα μὲν ἐν ἀμφοῖν ἐστὶν τὸ ἀμφοῖν μέλος, εἰ
δὲ μή, ἐν τῷ βαρεῖ· μείζον γάρ;

Διὰ τί λανθάνει τὸ διὰ πασῶν, καὶ δοκεῖ ὁμό- 14

¹ ἂν γὰρ δέηται ἄσαι τὴν παραμέσσην σὺν ψιλῇ τῇ μέσση, γίνεται
τὸ μέσον οὐθὲν ἡττον· εἰ δὲ τὴν μέσσην, δέον ἄμφω, ψιλὰ οὐ
γίνεται. Ruelle: reading in text Monro.

^a It is apparently true that in certain circumstances an echo is an octave higher than the original.

^b The meaning of this problem is obscure and indeed with the ms. text nothing can be made of it. For the purpose of the present translation Monro's emendation has been accepted.

^c Usually the other way in modern music, but the so-called "descant" is on this principle.

^d If, that is, the length of the string is stopped in the

PROBLEMS, XIX. 9-14

number of flute-players or a number of lyres is not so pleasant, because it obscures the song.

Why is it that—granting that the human voice is a 10 pleasanter sound than that of instruments—the voice of one who sings without words (as do those who hum) is not so pleasant as the sound of the flute or lyre? Or in the latter case do we fail to get as much pleasure, unless it is descriptive? Of course, if so, it is due to the actual production. For the human voice is a pleasanter sound, but instruments strike a note more effectively than the human mouth. So the sound of instruments is pleasanter to listen to than humming.

Why is a sound which is an echo higher than the 11 original? ^a Is it because, being smaller, it is less powerful?

^b Why is it that the lower of the two strings always 12 has the tune? ^c If one omits the paramese when one should sound it with the mese, the tune is there none the less; but if one omits the mese when one should strike both, the tune is missing. Is it because the lower note is weighty, so that it is strong? And the smaller is contained in the greater; moreover by dividing the string in half it is found that two netes are contained in the hypate. ^d

Why is it that in the octave the concord of the 13 upper note exists in the lower, but not *vice versa*? Is it because, at best, the sound of both exists in both, but if not so then it exists in the lower note; for it is greater?

Why is it that the difference of an octave may be 14 undetected and appear to be in unison as in the middle, the length either side of this stop will be an octave above.

918 b

φωνον εἶναι, οἷον ἐν τῷ φοινικίῳ καὶ ἐν τῷ ἀν-
 θρώπῳ; τὰ γὰρ ἐν τοῖς ὀξέσιν ὄντα οὐχ ὁμόφωνα,
 10 ἀλλ' ἀνὰ λόγον ἀλλήλοις διὰ πασῶν. ἢ ὅτι ὡσπερ
 ὁ αὐτὸς εἶναι δοκεῖ φθόγγος διὰ τὸ ἀνάλογον. (τὸ
 δὲ ἀνάλογον)¹ ἰσότης ἐπὶ φθόγγων, τὸ δὲ ἴσον
 τοῦ ἐνός; ταῦτὸ δὲ τοῦτο καὶ ἐν ταῖς σύριγξιν
 ἐξαπατῶνται.

Διὰ τί οἱ μὲν νόμοι οὐκ ἐν ἀντιστρόφοις ἐποιοῦντο, 15
 αἱ δὲ ἄλλαι ὥδαι αἱ χορικάι; ἢ ὅτι οἱ μὲν νόμοι
 15 ἀγωνιστῶν ἦσαν, ὧν ἤδη μιμεῖσθαι δυναμένων καὶ
 διατείνεσθαι ἢ ὥδῃ ἐγένετο μακρὰ καὶ πολυειδής;
 καθάπερ οὖν καὶ τὰ ῥήματα, καὶ τὰ μέλη τῇ
 μιμήσει ἠκολούθει αἰεὶ ἕτερα γινόμενα. μᾶλλον γὰρ
 τῷ μέλει ἀνάγκη μιμεῖσθαι ἢ τοῖς ῥήμασιν. διὸ
 καὶ οἱ διθύραμβοι, ἐπειδὴ μιμητικοὶ ἐγένοντο,
 20 οὐκέτι ἔχουσιν ἀντιστρόφους, πρότερον δὲ εἶχον.
 αἴτιον δὲ ὅτι τὸ παλαιὸν οἱ ἐλεύθεροι ἐχόρευον
 αὐτοί· πολλοὺς οὖν ἀγωνιστικῶς ἄδειν χαλεπὸν
 ἦν, ὥστε ἐναρμόνια μέλη ἐνήδον. μεταβάλλειν γὰρ
 πολλὰς μεταβολὰς τῷ ἐνὶ ῥᾶον ἢ τοῖς πολλοῖς, καὶ
 τῷ ἀγωνιστῇ ἢ τοῖς τὸ ἦθος φυλάττουσιν. διὸ
 25 ἀπλούστερα ἐποίουν αὐτοῖς τὰ μέλη. ἢ δὲ ἀντί-
 στροφος ἀπλοῦν· εἰς ῥυθμὸς² γὰρ ἐστὶ καὶ ἐνὶ
 μετρεῖται. τὸ δ' αὐτὸ αἴτιον καὶ διότι τὰ μὲν ἀπὸ
 τῆς σκηνηῆς οὐκ ἀντίστροφα, τὰ δὲ τοῦ χοροῦ
 ἀντίστροφα· ὁ μὲν γὰρ ὑποκριτῆς ἀγωνιστῆς, καὶ
 μιμητῆς, ὁ δὲ χορὸς ἤττον μιμεῖται.

¹ <τὸ δὲ ἀνάλογον> added by Forster from Th. G.

² εἰς ῥυθμὸς Jan : ἀριθμὸς Ruelle.

^a Herodotus iv. 192 mentions this instrument as made of the horns of an animal.

^b i.e. when a man and lyre sound a note together.

PROBLEMS, XIX. 14-15

Phoenician lyre ^a and in the human voice? ^b For the sound contained in the upper notes is not in unison with the lower, but they are analogous to each other at the octave. Is it because the sounds of the two seem identical by analogy; for analogy in sounds means equality, and equality is of the one? Men are deceived in the same way by the sound of pipes.

Why were not the tunes called *nomes* arranged in 15 antistrophes, like other choric songs? Is it because *nomes* were delivered by professional artists, and, as their function was to imitate actions and sustain them, the song became long and took many forms? The music, then, conformed to the imitation in the same way as the words and continually varied. In fact it was necessary to imitate by the tune even more than by the words. For the same reason the dithyrambs, once they had become imitative, were no longer antistrophic, as they had previously been. The reason is, that in the old days free citizens acted in the choruses; hence it was difficult for a number to sing together like professional artists, so that they performed their songs in the enharmonic scale; for it is easier for one person alone to execute variations than for a number, and for a professional artist than for those who have to preserve the character of the music. That is why they composed simpler music for them. The antistrophic composition is a simple thing; for it is composed in a single rhythm and in a single metre. It is for the same reason that songs performed on the stage are not antistrophic, while those performed by the chorus are; for the actor is a professional artist and imitator, but the chorus is less capable of filling an imitative rôle.

918 b

30 Διὰ τί ἥδιον τὸ ἀντίφωνον τοῦ συμφώνου; ἢ 16
ὅτι μᾶλλον διάδηλον γίνεται τὸ συμφωνεῖν ἢ ὅταν
πρὸς τὴν συμφωνίαν ἄδῃ; ἀνάγκη γὰρ τὴν
ἐτέραν ὁμοφωνεῖν, ὥστε δύο πρὸς μίαν φωνὴν
γινόμεναι ἀφανίζουσι τὴν ἐτέραν.

Διὰ τί διὰ πέντε οὐκ ἄδουσιν ἀντίφωνα; ἢ ὅτι 17
35 οὐχ ἡ αὐτὴ ἡ σύμφωνος τῇ συμφωνίᾳ, ὥσπερ
ἐν τῷ διὰ πασῶν; ἐκείνη γὰρ ἡ βαρεῖα ἐν τῷ
βαρεῖ ἀνάλογον, ὡς ἡ ὀξεῖα ἐν τῷ ὀξεῖ. ὥσπερ
οὖν ἡ αὐτὴ ἐστὶν ἅμα καὶ ἄλλη. αἱ δὲ ἐν τῷ
διὰ πέντε καὶ διὰ τεττάρων οὐκ ἔχουσιν οὕτως,
ὥστε οὐκ ἐμφαίνεται ὁ τῆς ἀντιφώνου φθόγγος.
οὐ γάρ ἐστὶν ὁ αὐτός.

40 Διὰ τί ἡ διὰ πασῶν συμφωνία ἄδεται μόνη; 18
919 a μαγαδίζουσι γὰρ ταύτην, ἄλλην δὲ οὐδεμίαν. ἢ
ὅτι μόνη ἐξ ἀντιφώνων ἐστὶ χορδῶν, ἐν δὲ ταῖς
ἀντιφώνοις καὶ τὴν ἐτέραν εἰάν ἄδῃ, τὸ αὐτὸ ποιεῖ;
ἢ γὰρ μία τρόπον τινὰ τὰς ἀμφοτέρων ἔχει φωνάς,
5 ὥστε καὶ μιᾶς ἀδομένης ἐν ταύτῃ τῇ συμφωνίᾳ
ἄδεται ἡ συμφωνία, καὶ ἀμφω ἄδοντες, ἢ τῆς μὲν
ἀδομένης τῆς δὲ αὐλουμένης, ὥσπερ μίαν ἀμφω
ἄδουσιν. διὸ μόνη μελωδεῖται, ὅτι μιᾶς ἔχει
χορδῆς φωνὴν τὰ ἀντίφωνα.

Διὰ τί δὲ ταῖς ἀντιφώνοις τοῦτο μόναις ὑπάρχει; 19

^c Antiphony here means the harmony of the octave, whereas consonance refers to the other two harmonies acknowledged by Greek music—the fourth and fifth. In some passages consonance covers the octave harmony as well.

^b The “harmonized” accompaniment consists of two notes: one in unison with the singer and the other a fourth or fifth higher. Greek music never considered any chord of more than two notes legitimate.

PROBLEMS, XIX. 16-19

Why is the antiphony^a pleasanter than consonance? 16
Is it because the concord is more obvious than when one sings to a harmonized accompaniment? ^b For one of the notes (played) must be in unison (with the note sung), so that the two played against one voice make the other note ^c imperceptible.

Why does not singing in fifths sound like the 17
octave? Is it because one part of the consonance is not the same as the other, as it is in the case of the octave? For in the case of the octave the low note is in the same position in the low register as the high note in the high register. In this way it is at one and the same time the same and different. But in fourths and fifths this is not so, so that the sound of the octave is not apparent; for it is not the same.

Why is the octave consonance alone used in singing? 18
For in magadizing^d they use this consonance and no other. Is it because it is the only instrument containing "octave" strings and in "octave" strings, if one sings the one, the effect is the same? For the one note contains in a sense both notes, so that when one is sung in this consonance the consonance is sung, and when they sing both or when one note is sung and the other played on the flute, they both as it were sing one note. So only one melody is produced, because the "octave" notes have the sound of a single note.

Why does this "single note" effect only exist in 19
the octave? Is it because these two notes alone

^c This other note is the fifth above the voice played by the instrument.

^d According to Athenaeus the magadis was an ancient instrument containing twenty strings, upon which two octaves could be played.

919 a

10 ἢ ὅτι μόναι ἴσον ἀπέχουσι τῆς μέσης; ἢ οὖν μεσότης ὁμοιότητά τινα ποιεῖ τῶν φθόγγων, καὶ ἔοικεν ἢ ἀκοὴ λέγειν ὅτι ἢ αὐτὴ καὶ ὅτι ἀμφοτέραι ἔσχαται.

Διὰ τί, ἐὰν μὲν τις τὴν μέσῃν κινήσῃ ἡμῶν 20 ἀρμόσας τὰς ἄλλας χορδὰς καὶ χρῆται τῷ ὄργάνῳ, οὐ μόνον ὅταν κατὰ τὸν τῆς μέσης γένηται φθόγγον, 15 λυπεῖ καὶ φαίνεται ἀνάρμοστον, ἀλλὰ καὶ κατὰ τὴν ἄλλην μελωδίαν· ἐὰν δὲ τὴν λιχανὸν ἢ τινα ἄλλον φθόγγον, τότε φαίνεται διαφέρειν μόνον, ὅταν κακεῖνη τις χρῆται; ἢ εὐλόγως τοῦτο συμβαίνει; πάντα γὰρ τὰ χρηστὰ μέλη πολλάκις τῇ 20 μέσῃ χρῆται, καὶ πάντες οἱ ἀγαθοὶ ποιηταὶ πυκνὰ πρὸς τὴν μέσῃν ἀπαντῶσιν, κὰν ἀπέλθωσι, ταχὺ ἐπανέρχονται, πρὸς δὲ ἄλλην οὕτως οὐδεμίαν. καθάπερ ἐκ τῶν λόγων ἐνίων ἐξαιρεθέντων συνδέσμων οὐκ ἔστιν ὁ λόγος Ἑλληνικός, οἷον τὸ τε καὶ τὸ καί, ἐνιοὶ δὲ οὐθὲν λυποῦσιν διὰ τὸ τοῖς μὲν 25 ἀναγκαῖον εἶναι χρῆσθαι πολλάκις, εἰ ἔσται λόγος, τοῖς δὲ μή, οὕτω καὶ τῶν φθόγγων ἢ μέσῃ ὡσπερ σύνδεσμός ἐστι, καὶ μάλιστα τῶν καλῶν, διὰ τὸ πλειστάκις ἐνυπάρχειν τὸν φθόγγον αὐτῆς.

Διὰ τί τῶν ἀδόντων οἱ βαρύτερον ἀδοντες τῶν 21 80 ὀξύ ἀδόντων, ἐὰν ἀπάδωσι, μᾶλλον κατάδηλοι γίνονται; ὁμοίως δὲ καὶ τῷ ῥυθμῷ οἱ ἐν τῷ βραδυτέρῳ πλημμελοῦντες κατάδηλοι μᾶλλον. πότερον ὅτι πλείων ὁ χρόνος ὁ τοῦ βαρέος, οὗτος δὲ μᾶλλον αἰσθητός [; ἢ]¹ ὅτι ἐν πλείονι χρόνῳ πλείω

¹ Omitting [ἢ] with Reinach and Eichtel.

^a It seems certain that the Greek scale was played (or con-
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are equidistant from the mese? This mean position gives a certain similarity of sounds, and the hearing seems to tell one that both are the same note and are extremes.

Why is it that, if one shifts the mese, after tuning 20 the other strings, and then plays the instrument, it is not only when the tune touches the sound of the mese that it is unpleasant and seems out of tune, but also in all the rest of the melody? If, on the other hand, one shifts the lichanos or any other note, then the difference is only apparent when one employs this particular note. This is only natural, for all the best tunes make frequent use of the mese,^a and all good musicians employ it frequently, and quickly revert to it, if they leave it, but not to any other note to the same extent. The same is true in conversation; if certain conjunctions, such as *τε* and *καί*, are omitted the language ceases to be Greek, but the omission of others gives no such offence, because there are some conjunctions which one must use often, if there is to be sense, but with others it is not so. In the same way with sounds, the mese is a kind of conjunction especially in good music, because its note most often underlies the tune.

Why is it that the mistakes of singers are more 21 noticeable in the low notes than in the high ones, if they sing out of tune? Similarly errors in time are more obvious in the slow tunes. Is it because the time occupied by the low note is longer, and therefore more noticeable? For in the longer time there is

ceived) as beginning with the fourth (mese) travelling down to the lowest note, up to the octave, and down again to the fourth. In this sense the mese would correspond to our key-note.

919^a αἴσθησιν παρέχει, τὸ δὲ ταχὺ¹ καὶ ὄξυ λανθάνει διὰ
35 τὸ τάχος.

Διὰ τί οἱ πολλοὶ μάλλον ἄδοντες τὸν ῥυθμὸν 22
σώζουσιν ἢ οἱ ὀλίγοι; ἢ ὅτι μάλλον πρὸς ἓνα τε
καὶ ἡγεμόνα βλέπουσι, καὶ βραδύτερον ἄρχονται,
ὥστε ῥᾶον τοῦ αὐτοῦ τυγχάνουσιν; ἐν γὰρ τῷ
τάχει ἡ ἁμαρτία πλείων.

919^b Διὰ τί διπλασία ἢ νήτη τῆς ὑπάτης; ἢ πρῶτον 23
μὲν ὅτι ἐκ τοῦ ἡμίσεος ἢ χορδῆ ψαλλομένη καὶ ὅλη
συμφωνοῦσι διὰ πασῶν; ὁμοίως δὲ ἔχει καὶ ἐπὶ
5 τῶν συρίγγων· ἢ γὰρ διὰ τοῦ μέσου τῆς σύριγγος
τρήματος φωνὴ τῇ δι' ὅλης τῆς σύριγγος συμφωνεῖ
διὰ πασῶν. ἔτι ἐν τοῖς αὐλοῖς τῷ διπλασίῳ δια-
στήματι λαμβάνεται τὸ διὰ πασῶν, καὶ οἱ αὐλο-
τρῦπαι οὕτως λαμβάνουσιν. ὁμοίως δὲ καὶ τὸ
διὰ πέντε τῷ ἡμιολίῳ. ἔτι οἱ τὰς σύριγγας
ἄρμοττόμενοι εἰς μὲν τὴν ὑπάτην ἄκραν τὸν κηρὸν
10 ἐμπλάττουσι, τὴν δὲ νήτην μέχρι τοῦ ἡμίσεος
ἀναπληροῦσιν. ὁμοίως δὲ καὶ τὴν διὰ πέντε τῷ
ἡμιολίῳ καὶ τὴν διὰ τεττάρων τῷ ἐπιτρίτῳ δια-
στήματι λαμβάνουσιν. ἔτι οἱ ἐν τοῖς τριγώνοις
ψαλτηρίοις τῆς ἴσης ἐπιτάσεως γινομένης συμ-
φωνοῦσιν διὰ πασῶν, ἢ μὲν διπλασία οὔσα, ἢ δὲ
ἡμίσεια τῷ μήκει.

15 Διὰ τί, εἴαν τις ψήλας τὴν νήτην [νήτην] ἐπιλάβῃ, 24
ἢ ὑπάτη μόνη δοκεῖ ἀντηχεῖν; ἢ ὅτι συμφυῆς
μάλιστα γίνεται τῷ φθόγγῳ ὃ ἀπὸ ταύτης ἦχος
διὰ τὸ σύμφωνος εἶναι; τῷ οὖν συναυξάνεσθαι

¹ ταχὺ MSS. : βαρὺ Ruelle.

^a The fact of sympathetic vibration was well known to the ancients. A poem in the *Anthology* (i. 46) contains the words "When I have just twanged the hypate with the plectrum on the right, nete on the left will vibrate auto-
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opportunity for more sensation, whereas the brief and high note escapes attention because of its speed.

Why can a number of persons singing together keep 22 the time better than a few? Is it because they look more to one person who is their leader, and begin more slowly, so that they easily strike the same moment? For error occurs more often in quick singing.

Why is nete double hypate? First of all is it 23 because the string when struck at half its length gives an octave with the string struck at full length? Just the same thing is true of pipes: the sound produced through the hole in the middle of the pipe makes an octave with the sound obtained through the whole pipe. In flutes also the octave is produced by an interval of twice the length, and those who bore pipes produce the result in this way. It is just the same with the interval of a fifth produced by a ratio of 3 to 2. Those who adjust pipes cram wax into the upper end of the hypate-reed and fill up the nete-reed to the middle. In the same way the interval of a fifth is made by an interval in the ratio of 3 to 2 and the fourth by an interval of 4 to 3. Moreover, in triangular harps with strings of equal tension an octave is produced when one string is double the other in length.

^a Why is it that if one first strikes the nete and then 24 stops it, the hypate and the hypate only seems to sound? Is it because the sound of the hypate owing to its consonance is very like the sound of the nete? When, then, it is increased by the addition of its like,

atically," and another ancient authority defines harmony thus "Two sounds are consonant if, when one produces one on a stringed instrument, the other also sounds in virtue of a certain affinity." Cf. Problem 42.

919 b

τῷ ὁμοίῳ φαίνεται ὁ ἄλλος, οἱ δὲ ἄλλοι διὰ μικρότητα ἀφανεῖς.

20 Διὰ τί μέση καλεῖται ἐν ταῖς ἀρμονίαις, τῶν δὲ 25 ὀκτῶ οὐκ ἔστι μέσον; ἢ ὅτι ἐπτάχορδοι ἦσαν αἱ ἀρμονίαι τὸ παλαιόν, τὰ δὲ ἐπτά ἔχει μέσον;

Διὰ τί ἐπὶ τὸ ὄξύ ἀπάδουσιν οἱ πλείστοι; πό- 26 τερον ὅτι ῥᾶον ὄξύ ᾄσαι ἢ βαρύν; ἢ ὅτι χεῖρον τοῦ βαρέος; ἀμαρτία δὲ ἔστι τοῦ χείρονος πράξις.

Διὰ τί τὸ ἀκουστὸν μόνον ἦθος ἔχει τῶν αἰ- 27 σθητῶν; καὶ γὰρ ἐὰν ἦ ἄνευ λόγου μέλος, ὅμως ἔχει ἦθος· ἀλλ' οὐ τὸ χρῶμα οὐδὲ ἡ ὀσμὴ οὐδὲ ὁ χυμὸς ἔχει. ἢ ὅτι κίνησιν ἔχει μόνον, οὐχὶ ἦν ὁ ψόφος ἡμᾶς κινεῖ; τοιαύτη μὲν γὰρ καὶ τοῖς 30 ἄλλοις ὑπάρχει· κινεῖ γὰρ καὶ τὸ χρῶμα τὴν ὄψιν· ἀλλὰ τῆς ἐπομένης τῷ τοιούτῳ ψόφῳ αἰσθανόμεθα κινήσεως. αὕτη δὲ ἔχει ὁμοιότητα ἐν τε τοῖς ῥυθμοῖς καὶ ἐν τῇ τῶν φθόγγων τάξει τῶν ὀξέων καὶ βαρέων, οὐκ ἐν τῇ μίξει. ἀλλ' ἡ συμφωνία 35 οὐκ ἔχει ἦθος. ἐν δὲ τοῖς ἄλλοις αἰσθητοῖς τοῦτο οὐκ ἔστιν. αἱ δὲ κινήσεις αὗται πρακτικαὶ εἰσιν, αἱ δὲ πράξεις ἠθους σημασία ἐστίν.

Διὰ τί νόμοι καλοῦνται οὓς ᾄδουσιν; ἢ ὅτι πρὶν 28 ἐπιστασθαι γράμματα, ἠῖδον τοὺς νόμους, ὅπως μὴ ἐπιλάθωνται, ὥσπερ ἐν Ἀγαθύρσοις ἔτι εἰώ- 320 a θασιν; καὶ τῶν ὑστέρων οὖν ὠδῶν τὰς πρώτας τὸ αὐτὸ ἐκάλεσαν ὅπερ τὰς πρώτας.

^a Mese = mean.

^b Cf. Problem 29. The ancients attributed to music a higher and more permanent influence than we do. It was considered that any moral quality could be cultivated by suitable music, for which reason the Spartans only allowed music of a martial character.

^c νόμοι means laws.

it alone seems to sound, the others being inaudible owing to their smallness.

Why is the mese ^a so called in music, seeing that 25 there is no mean of eight? Is it because in old days all scales were heptachords, and there is a mean of seven?

Why do most singers sing sharp when they get out 26 of tune? Is it because it is easier to sing high than low? Or is it because the error is worse than when the singing is flat? And an error consists in doing what is worse.

^b Why is what is heard the only object of perception 27 which possesses moral character? For every tune, even if it has no words, has nevertheless character; but neither colour, smell nor flavour have it. Is it because sound alone has movement, though not of course the movement which it produces in us? For movement of this kind exists in other senses too, for colour moves our sight; but we are conscious of the movement which follows such and such a sound. This movement has a semblance of moral character both by the time and by the arrangement of the higher and lower sounds, but not in their mixture. Consonance has no moral character. This character does not exist in the other perceptibles. But the movements with which we are dealing are connected with action, and actions are symptoms of moral character.

Why are the nomes which men sing so called? Is 28 it because before men could write, they sang their laws,^c to avoid forgetting them, as they still do among the Agathyrsi? So they gave the same name to the first of their later songs which they had given to their first songs.^d

^d The reading here seems doubtful.

920 a

5 Διὰ τί οἱ ῥυθμοὶ καὶ τὰ μέλη φωνῆ οὔσα ἤθεσι 29
 ἔοικεν, οἱ δὲ χυμοὶ οὐ, ἀλλ' οὐδὲ τὰ χρώματα καὶ
 αἱ ὀσμαί; ἢ ὅτι κινήσεις εἰσὶν ὥσπερ καὶ αἱ
 πράξεις; ἤδη δὲ ἡ μὲν ἐνέργεια ἠθικὸν καὶ ποιεῖ
 ἦθος, οἱ δὲ χυμοὶ καὶ τὰ χρώματα οὐ ποιούσιν
 ὁμοίως.

Διὰ τί οὐδὲ ὑποδωριστὶ οὐδὲ ὑποφρυγιστὶ οὐκ 30
 ἔστιν ἐν τραγωδίᾳ χορικόν; ἢ ὅτι οὐκ ἔχει
 10 ἀντίστροφον; ἀλλ' ἀπὸ σκηνηῆς· μιμητικὰ¹ γάρ.

Διὰ τί οἱ περὶ Φρύνιχον ἦσαν μάλλον μελοποιοί; 31
 ἢ διὰ τὸ πολλαπλάσια εἶναι τότε τὰ μέλη ἐν ταῖς
 τραγωδίαις τῶν μέτρων;

Διὰ τί διὰ πασῶν καλεῖται, ἀλλ' οὐ κατὰ τὸν 32
 15 ἀριθμὸν δι' ὀκτώ, ὥσπερ καὶ διὰ τεττάρων καὶ
 διὰ πέντε; ἢ ὅτι ἑπτὰ ἦσαν αἱ χορδαὶ τὸ ἀρχαῖον.
 εἴτ' ἐξελὼν τὴν τρίτην Τέρπανδρος τὴν νήτην
 προσέθηκεν, καὶ ἐπὶ τούτου ἐκλήθη διὰ πασῶν,
 ἀλλ' οὐ δι' ὀκτώ· ἑπτὰ γὰρ ἦν.

Διὰ τί εὐαρμοστότερον ἀπὸ τοῦ ὀξέος ἐπὶ τὸ 33
 20 βαρὺ ἢ ἀπὸ τοῦ βαρέος ἐπὶ τὸ ὀξύ; πότερον ὅτι
 τὸ μὲν ἀπὸ τῆς ἀρχῆς γίνεται ἄρχεσθαι; ἢ γὰρ
 μέση καὶ ἠγεμῶν [καὶ] ὀξυτάτη τοῦ τετραχόρδου.
 τὸ δὲ οὐκ ἀπ' ἀρχῆς, ἀλλ' ἀπὸ τελευτῆς. ἢ ὅτι τὸ
 βαρὺ ἀπὸ τοῦ ὀξέος γενναιότερον καὶ εὐφωνότερον;

¹ μιμητικὰ Wagener : μιμητικὴ Ruelle.

^a These scales cannot be exactly represented in modern notation. But approximately they are as follows :

Hypodorian (diatonic):

d, e \flat , f, g, a, b \flat , c, d, e

Hypophrygian :

e, f \sharp , g \sharp , a, b, c \sharp , d, e

but this exhibits the scales in a pitch-relation of which they are to a great extent independent.

Why do rhythm and tune, which are only an 29 emission of the voice, resemble moral character, while flavours, colours and scents do not? Is it because, like actions, they are movements? Now, action is a moral fact and implies a moral character, but flavours and colours do not act in the same way.

Why is neither the hypodorian nor hypophrygian ^a 30 mode used by the chorus in tragedy? Is it because they do not admit of antistrophic treatment? But they are used from the stage, for they are imitative.

^b Why were Phrynichus and tragedians of his date 31 primarily musicians? Is it because at that time there were many more songs than metrical lines in the tragedies?

Why is the octave called "the diapason" ^c instead 32 of being called the diocto according to the number of the notes, in the same way as the terms used for the fourth and fifth? Is it because originally there were seven strings? Then Terpander took away the trite and added the nete, and at that time it was called the diapason not the diocto, for there were seven notes.

Why is it more convenient to pass from high to low 33 than from low to high? Is it because the former is beginning at the beginning? For the mese or "leader" is the highest note of the tetrachord. The latter starts not at the beginning but at the end. Or is it because the low note after the high one is nobler and more euphonious?

^b Aristotle, *Poetics*, 4. 16, mentions that Aeschylus among others reforms of tragedy assigned the leading part to the dialogue.

^c "Diapason" literally translated means an interval extending over the whole range of notes.

920 a

Διὰ τί δις μὲν δι' ὀξειῶν καὶ δις διὰ τεττάρων 34
 25 οὐ συμφωνεῖ, δις διὰ πασῶν δέ; ἢ ὅτι οὐ δις δι'
 ὀξειῶν οὐδὲ δις διὰ τεττάρων * * * ἐστίν, τὸ δὲ
 διὰ τεττάρων καὶ διὰ πέντε * * *

Διὰ τί ἢ διὰ πασῶν καλλίστη συμφωνία; ἢ 35
 ὅτι ἐν ὅλοις ὄροις οἱ ταύτης λόγοι εἰσίν, οἱ δὲ τῶν
 ἄλλων οὐκ ἐν ὅλοις; ἐπεὶ γὰρ διπλασία ἢ νήτη τῆς
 30 ὑπάτης, οἷα ἢ νήτη δύο, ἢ ὑπάτη ἕν, καὶ οἷα ἢ
 ὑπάτη δύο, ἢ νήτη τέσσαρα, καὶ αἰεὶ οὕτως. τῆς
 δὲ μέσης ἡμιολία. τὸ γὰρ διὰ πέντε ἡμιόλιον οὐκ
 ἐν ὅλοις ἀριθμοῖς ἐστίν· οἷον γὰρ ἐν τὸ ἔλαττον, τὸ
 μείζον τοσοῦτον δὲ καὶ ἔτι τὸ ἡμισυ. ὥστε οὐχ
 ὅλα πρὸς ὅλα συγκρίνεται, ἀλλ' ἔπεστι μέρη.
 35 ὁμοίως δὲ καὶ ἐν τῷ διὰ τεττάρων ἔχει· τὸ γὰρ
 ἐπίτριτόν ἐστιν ὅσον ἐκεῖνο¹ καὶ ἔτι ἐν τῶν τριῶν
 [ἐπίτριτόν ἐστιν]. ἢ ὅτι τελεωτάτη ἢ ἐξ ἀμφο-
 τέρων οὔσα, καὶ ὅτι μέτρον τῆς μελωδίας * * * 35 a
 διὰ παντὸς τοῦ φερομένου ἢ κατὰ μέσον κίνησις
 920 b σφοδροτάτη, ἀρχομένου δὲ καὶ λήγοντος μαλα-
 κωτέρα; ὅτε δὲ σφοδροτάτη ἢ κίνησις, καὶ ἢ
 φωνὴ ὀξύτερα τοῦ φερομένου. διὸ καὶ χορδαὶ
 ἐπιτεινόμεναι ὀξύτερον φθέγγονται· θᾶπτον γὰρ
 ἢ κίνησις γίνεται. εἰ δὲ φωνὴ ἢ αἶρος ἢ ἄλλου
 5 τινὸς φορά, τὴν ἀνὰ μέσον τὸν πόρον ὀξύτάτην δεῖ
 γίνεσθαι. ὥστε εἰ τοῦτο μὴ συμβαίνει, οὐκ ἂν
 εἶη φορά τινος.

¹ ἐκεῖνο Bekker : τεμεῖν ὁ Ruelle.

^a Th. G. translates δι' ὀξειῶν as diapente and there is independent evidence for this meaning.

^b Aristotle is regarding one of the terms of the ratio as one in each case.

Why is neither a double fifth ^a nor a double fourth 34
a consonance whereas a double octave is? Is it
because neither a double fifth nor a double fourth is
a consonance, but a combination of a fourth and a
fifth are so?

Why is the octave consonance the most beautiful? 35
Is it because the ratios of which it is composed consist
of whole numbers, but the ratios of other intervals
are not in whole numbers? For nete is double of
hypate, so, if nete is two, hypate is one, or, if hypate
is two, nete is four and so on. But the ratio of nete
to mese is three to two. For the fifth (being in a
ratio of three to two) is not contained by whole
numbers; for supposing the lesser term be one, the
larger will be one ^b and a half. So that it cannot be
regarded as a ratio of two whole numbers, but a
fraction is added. The same thing is true of the
fourth; for the ratio of four to three gives us one
term as big as the other plus one third. Or is it
because the most perfect consonance is that comprised
by the two, and this is the measure of the melody?

^c In every displaced body the movement in the 35 a
middle is the most violent, but is gentler at the
beginning and at the end. When the movement is
most violent the sound of a displaced body is sharper.
This is why strings when stretched sound a higher
note; for their movement becomes more rapid. But
the voice is the movement of the air or something
else; so a sound must be highest in the middle of its
course. If this were not the case there would be no
displacement.

^c The mss. make 35 and 35 a one Problem, which is
most unsatisfactory. The second part is certainly a new
Problem, but its statement is missing in all the mss. and in the
Latin translation.

Διὰ τί, ἐὰν μὲν ἢ μέση κινηθῆ, καὶ αἱ ἄλλαι 36
 χορδαὶ ἠχοῦσι φθειρόμεναι,¹ ἐὰν δὲ αὖ ἢ μὲν μένη
 τῶν δ' ἄλλων τις κινηθῆ, <ἢ>² κινηθεῖσα μόνη
 10 φθείρεται,³ ἢ ὅτι τὸ ἠρμόσθαι ἐστὶν ἀπάσαις τὸ [δὲ]
 ἔχειν πῶς πρὸς τὴν μέσην [ἀπάσαις],⁴ καὶ ἢ τάξις ἢ
 ἐκάστης ἤδη δι' ἐκείνην; ἀρθέντος οὖν τοῦ αἰτίου
 τοῦ ἠρμόσθαι καὶ τοῦ συνέχοντος οὐκέτι ὁμοίως
 φαίνεται ὑπάρχειν. μιᾶς δὲ ἀναρμόστου οὔσης,
 τῆς δὲ μέσης μενούσης, εὐλόγως τὸ κατ' αὐτὴν ἐκ-
 15 λείπει μονον⁵. ταῖς γὰρ ἄλλαις ὑπάρχει τὸ ἠρμόσθαι.

Διὰ τί τοῦ ἐν φωνῇ ὀξέος ὄντος κατὰ τὸ ὀλίγον, 37
 τοῦ δὲ βαρέος κατὰ τὸ πολὺ (τὸ μὲν γὰρ βαρὺ διὰ
 τὸ πλῆθος βραδύ, τὸ δὲ ὀξύ δι' ὀλιγότητα ταχύ),
 ἔργον μᾶλλον ἄδειν τὰ ὀξέα ἢ τὰ βαρέα, καὶ ὀλίγοι
 20 τὰ ἄνω δύνανται ἄδειν, καὶ οἱ νόμοι ὄρθιοι καὶ οἱ
 ὀξεῖς χαλεποὶ ἄσαι διὰ τὸ ἀνατεταμένοι εἶναι;
 καίτοι ἔλαττον ἔργον τὸ ὀλίγον κινεῖν ἢ τὸ πολὺ,
 ὥστε καὶ αέρα. ἢ οὐ ταῦτό γε ὀξύφωνον εἶναι
 φύσει καὶ τὸ ὀξύ ἄδειν, ἀλλὰ φύσει μὲν ὀξύφωνα
 ἅπαντα δι' ἀσθένειαν τῷ μὴ δύνασθαι πολὺν κινεῖν
 25 αέρα, ἀλλ' ὀλίγον, ὃ δ' ὀλίγος ταχὺ φέρεται, ἐν δὲ
 τῷ ἄδειν τὸ ὀξύ δυνάμεως σημείον; τὸ μὲν γὰρ
 σφοδρῶς φερόμενον ταχὺ φέρεται, διὸ τὸ ὀξύ
 δυνάμεως σημείον. διὸ καὶ οἱ εὐεκτικοὶ⁶ ὀξύφωνοι.
 καὶ ἔργον τὰ ἄνω ἄδειν· τὰ δὲ βαρέα κάτω.

Διὰ τί ῥυθμῶ καὶ μέλει καὶ ὅλως ταῖς συμ- 38
 30 φωνίαις χαίρουσι πάντες; ἢ ὅτι ταῖς κατὰ φύσιν

¹ φθειρόμεναι Stark : φθειγγόμεναι Ruelle.

² <ἢ> added by Sylburg.

³ φθείρεται Stark : φθέγγεται Ruelle.

⁴ Omitting [δὲ] and [ἀπάσαις].

⁵ ἐκλείπει μόνον Bojesen : ἐκλειπόμενον Ruelle.

⁶ εὐεκτικοὶ W. D. Ross : ἐκτικοὶ Ruelle.

¹ This seems an absurd comment, and the word κάτω must
 400

Why is it that if the mese is touched, the sound 36 of the other strings is spoilt, but if on the other hand the mese is still and one of the other strings is touched, only that which is touched is spoilt? Is it because for all the strings "being in tune" means standing in a certain relation to the mese, and each one's position is already determined by the mese? When the cause of being in tune and that which holds them together is removed, this no longer seems to be the same. When, then, one string is out of tune but the mese remains unaltered, naturally that string alone fails; for the others are already in tune.

Why is it a greater effort to sing high notes than 37 low ones, although "height" in voice requires but little breath and "low" requires much (for the low is slow because of the quantity of air, while the high note travels fast because of the small quantity) and few men can sing high notes, and the "Orthian" and other high songs are difficult to sing because they involve strain? Yet it requires less effort to move a small quantity than to move a large quantity of anything and therefore also of air. Is it because it is one thing to possess a naturally high voice, and another to sing a high note, but all naturally high voices are so owing to weakness, because they cannot move much air but only a little, and a small quantity of air travels fast, but to produce a high note in singing is a sign of power? For sound which is carried violently along is carried swiftly; therefore the singing of a high note is a sign of power. So men in good health have high voices. It requires an effort to sing the upper notes; but the low ones are below them.^a

Why does everyone enjoy rhythm and tune, and in 38 general all consonances? Is it because we naturally be corrupt. *ρᾶον* has been suggested meaning "a smaller task," which would fit the context.

920 b

κινήσει χαίρομεν κατὰ φύσιν; σημείον δὲ τὸ τὰ
 παιδία εὐθὺς γενόμενα χαίρειν αὐτοῖς. διὰ δὲ τὸ
 ἔθος τρόποις μελῶν χαίρομεν. ῥυθμῶ δὲ χαίρομεν
 διὰ τὸ γνώριμον καὶ τεταγμένον ἀριθμὸν ἔχειν καὶ
 35 κινεῖν ἡμᾶς τεταγμένως· οἰκειότερα γὰρ ἢ τεταγ-
 μένη κίνησις φύσει τῆς ἀτάκτου, ὥστε καὶ κατὰ
 φύσιν μᾶλλον. σημείον δέ· πονοῦντες γὰρ καὶ
 πίνοντες καὶ ἐσθίωντες τεταγμένα σώζομεν καὶ
 αὐξομεν τὴν φύσιν καὶ τὴν δύναμιν, ἄτακτα δὲ
 921 a φθείρομεν καὶ ἐξίσταμεν αὐτήν· αἱ γὰρ νόσοι τῆς
 τοῦ σώματος οὐ κατὰ φύσιν τάξεως κινήσεις εἰσίν.
 συμφωνία δὲ χαίρομεν, ὅτι κράσις ἐστὶν λόγον
 ἐχόντων ἐναντίων πρὸς ἄλληλα. ὁ μὲν οὖν λόγος
 τάξις, ὃ ἦν φύσει ἡδύ. τὸ δὲ κεκραμένον τοῦ
 5 ἀκράτου πᾶν ἡδιον, ἄλλως τε κἂν αἰσθητὸν ὄν
 ἀμφοῖν τοῖν ἄκροις ἐξ ἴσου τὴν δύναμιν ἔχει ἐν τῇ
 συμφωνίᾳ ὁ λόγος.

Διὰ τί ἡδιόν ἐστι τὸ σύμφωνον τοῦ ὁμοφώνου; 39
 ἢ καὶ τὸ μὲν ἀντίφωνον σύμφωνόν ἐστι διὰ πασῶν;
 ἐκ παίδων γὰρ <καὶ> νέων καὶ ἀνδρῶν γίνεται τὸ
 10 ἀντίφωνον, οἱ διεστᾶσι τοῖς τόνοις ὡς νήτη πρὸς
 ὑπάτην. συμφωνία δὲ πᾶσα ἡδίων ἀπλοῦ φθόγγου
 (δι' ἃ δέ, εἴρηται), καὶ τούτων ἢ διὰ πασῶν ἡδίστη·
 τὸ ὁμόφωνον δὲ ἀπλοῦν ἔχει φθόγγον. μαγαδίζουσι
 δὲ ἐν τῇ διὰ πασῶν συμφωνίᾳ, ὅτι καθάπερ ἐν
 τοῖς μέτροις οἱ πόδες ἔχουσι πρὸς αὐτοὺς λόγον
 15 ἴσον πρὸς ἴσον ἢ δύο πρὸς ἓν ἢ καὶ τινα ἄλλον,
 οὕτω καὶ οἱ ἐν τῇ συμφωνίᾳ φθόγγοι λόγον ἔχουσι
 κινήσεως πρὸς αὐτούς. τῶν μὲν οὖν ἄλλων συμ-
 φωνιῶν ἀτελεῖς αἱ θατέρου καταστροφαί εἰσιν, εἰς

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enjoy natural movements? This is proved by the fact that newly born infants enjoy such. We enjoy different types of song for their moral character, but we enjoy rhythm because it has a recognized and orderly numerical arrangement and carries us along in an orderly fashion; for orderly movement is naturally more akin to us than one without order, and so more in accord with nature. Here is a proof of this: if we take our exercise and eat and drink in an orderly fashion we preserve and improve our nature and our strength, but by a disorderly method we ruin and spoil it; for bodily diseases are unnatural disturbances of order. But we enjoy harmony, because it is a mingling of opposites which bear a relation to each other. Now a relation implies an ordered arrangement, which is naturally pleasant. But everything mixed is more pleasant than unmixed, especially if in the sensible world the relation existing in the harmony has the power of the two extremes in equal balance.

Why is the octave a pleasanter sound than unison? 39
Is it because it is a consonance over the whole range of the octave? For an octave is produced by the voices of children and men, who differ in pitch as nete and hypate. But every consonance is pleasanter than the single sound (we have already explained why this is so), and of all such consonances the octave is the pleasantest; but unison is a simple sound. For in magadizing we use the octave consonance, because just as in metre the feet have a ratio to each other either of one to one, or of two to one, or some other ratio, so also in consonance the sounds have a ratio of movement to each other. In the case of other harmonies the termination of one of the two notes is

921 a

ἤμισυ τελευτῶσαι· διὸ τῇ δυνάμει οὐκ ἴσαι εἰσίν.
 20 οὔσαι δὲ ἄνισοι, διαφορὰ τῇ αἰσθήσει καθάπερ ἐν
 τοῖς χοροῖς, ἐν τῷ καταλύειν μείζον ἄλλων φθεγγο-
 μένοις ἐστίν. ἔτι δὲ ὑπάτη συμβαίνει τὴν αὐτὴν
 τελευτὴν τῶν ἐν τοῖς φθόγγοις περιόδων ἔχειν. ἡ
 γὰρ δευτέρα τῆς νεάτης πληγῆ τοῦ ἀέρος ὑπάτη
 ἐστίν. τελευτώσαις δ' εἰς ταῦτόν, οὐ ταῦτόν
 25 ποιούσαις, ἐν καὶ κοινὸν τὸ ἔργον συμβαίνει
 γίνεσθαι, καθάπερ τοῖς ὑπὸ τὴν ὠδὴν κρούουσιν·
 καὶ γὰρ οὗτοι τὰ ἄλλα οὐ προσαυλοῦντες, εἰς
 εἰς ταῦτόν καταστρέφωσιν, εὐφραίνουσι μᾶλλον τῷ
 τέλει ἢ λυποῦσιν ταῖς πρὸ τοῦ τέλους διαφοραῖς,
 τῷ [τὸ] ἐκ διαφόρων τὸ κοινὸν ἡδιστον <ὄν>¹ ἐκ τοῦ
 30 διὰ πασῶν γίνεσθαι. τὸ δὲ μαγαδίζειν ἐξ ἐναντίων
 φωνῶν. διὰ ταῦτα ἐν τῇ διὰ πασῶν μαγαδίζουσιν.

Διὰ τί ἡδιον ἀκούουσιν ἀδόντων ὅσα ἂν 40
 προεπιστάμενοι τύχῃσι τῶν μελῶν, ἢ εἰ μὴ
 ἐπιστῶνται; πότερον ὅτι μᾶλλον δῆλός ἐστιν
 35 ὁ τυγχάνων ὥσπερ σκοποῦ, ὅταν γνωρίζωσι τὸ
 ἀδόμενον; γνωρίζοντων δὲ ἡδὺ θεωρεῖν. ἢ ὅτι
 συμπαθής ἐστιν ὁ ἀκροατῆς τῷ τὸ γνώριμον
 ἀδοντι; συνάδει γὰρ αὐτῷ. ἀδει δὲ πᾶς γεγηθὼς
 ὁ μὴ διὰ τινα ἀνάγκην ποιῶν τοῦτο.

921 b Διὰ τί δις μὲν δι' ὀξειῶν ἢ δις διὰ τεττάρων οὐ 41
 συμφωνεῖ, δις διὰ πασῶν δέ; ἢ ὅτι τὸ μὲν διὰ
 πέντε ἐστὶν ἐν ἡμιολίῳ λόγῳ, τὸ δὲ διὰ τεττάρων
 ἐν ἐπιτρίτῳ; ὄντων δὲ ἡμιολίων τριῶν² ἐξῆς

¹ Omitting [τὸ] and inserting <ὄν> with Forster.

² Reading τριῶν mss. : δυοῖν Ruelle.

^a Cf. Problem 23.

^b Cf. Problem 5.

PROBLEMS, XIX. 39-41

incomplete, ending it may be in half ; this is why they are not of equal strength. Being unequal they sound different to the ear, as they do in choruses, when at the end some sing louder than others. Moreover it happens that hypate has the same ending as nete in its periodic sounds. For the second blow on the air made by nete is hypate.^a But since they finish at the same moment, though they do not perform the same function, they are actually accomplishing a common task, like those who accompany a song on an instrument. For such accompanists, though in the other parts of the song they may play different notes, give pleasure at the end, if they finish on the same note, which is greater than the pain they cause by differences before the end, because after the diversity of notes the common note due to the accord in the octave is very pleasing. Now magadizing is produced by notes of contrary kinds. This is why they magadize in the octave.

^b Why does one listen with more pleasure to the 40 singing of tunes which one knows beforehand, than if one does not know them ? Is it because the attainment of his aim by the singer is more obvious, when one knows what is being sung ? And when they recognize the aim it is pleasant to contemplate it. Or is it because the listener is sympathetic with one who sings a tune he knows ? For he is singing it with him. And everyone who is not obliged to sing enjoys singing.

Why is it that a double fifth ^c and a double fourth 41 are not consonant, whereas a double octave is ? Is it due to the fact that a fifth is a ratio of 3 to 2, and a fourth a ratio of 4 to 3 ? If, then, one has a succession of three numbers involving the ratios of 3 to 2, or

^c Cf. Problem 34.

ARISTOTLE

921 b

5 ἀριθμῶν ἢ ἐπιτρίτων οἱ ἄκροι πρὸς ἀλλήλους
οὐδένα λόγον ἔξουσιν· οὔτε γὰρ ἐπιμόριοι οὔτε
πολλαπλάσιοι ἔσονται. τὸ δὲ διὰ πασῶν, ἐπειδὴ
ἐστὶν ἐν διπλασίῳ λόγῳ, δις τούτου γινομένου,
ἐν τετραπλασίῳ λόγῳ ἂν εἶεν οἱ ἄκροι πρὸς
ἀλλήλους. ὥστ' ἐπεὶ συμφωνία εὐλογον ἔχόντων
φθόγγων πρὸς ἀλλήλους ἐστίν, λόγον δὲ οἱ μὲν τὸ
10 δις διὰ πασῶν διάλειμμα ἔχοντες πρὸς ἀλλήλους
φθόγγοι ἔχουσιν, οἱ δὲ τὸ δις διὰ τεττάρων ἢ δις
διὰ πέντε οὐκ ἔχουσιν, οἱ μὲν δις διὰ πασῶν σύμ-
φωνοι εἶεν ἂν, οἱ δ' ἕτεροι οὐ, διὰ τὰ εἰρημένα.

Διὰ τί, εἰάν τις ψήλας τὴν νήτην ἐπιλάβῃ, ἢ 42
15 ὑπάτη μόνη δοκεῖ ὑπηχεῖν; ἢ ὅτι ἢ νεάτη λήγουσα
καὶ μαραινομένη ὑπάτη γίνεται; σημεῖον δὲ τὸ
ἀπὸ τῆς ὑπάτης τὴν νεάτην δύνασθαι ἄδειν· ὡς
γὰρ οὔσης ἀντωδῆς <τῆς>¹ νεάτης, τὴν ὁμοιότητα
λαμβάνουσιν ἀπ' αὐτῆς. ἐπεὶ δὲ καὶ ἡχὼ ἀντωδῆ²
τίς ἐστὶν [ἀφή ἐστι] φωνῆς <καὶ> τῆς νεάτης
20 ληγούσης, ἡχος ὧν ὁ αὐτὸς τῷ τῆς ὑπάτης φθόγγῳ
κινεῖται,³ εἰκότως τῇ ὁμοιότητι τὴν ὑπάτην ἢ
νήτην δοκεῖ κινεῖν. τὴν μὲν γὰρ νεάτην ἴσμεν <ὅτι>
οὐ κινεῖται ἐπιληφθεισα· τὴν δὲ ὑπάτην αὐτὴν
ὀρώντες ἀκατάληπτον οὔσαν, καὶ φθόγγου αὐτῆς
ἀκούοντες, ταύτην οἰόμεθα ἡχεῖν· ὅπερ ἐπὶ πολλῶν
25 ἡμῖν συμβαίνει, ἐφ' ὧν μήτε τῷ λογισμῷ μήτε τῇ
αἰσθήσει δυνάμεθα εἰδῆσαι τὸ ἀκριβές. ἔτι εἰ

¹ ἀντωδῆς <τῆς> W. D. Ross : αὐτῆς ὠδῆς Ruelle.

² ἀντωδῆ W. D. Ross : ὠδῆ Ruelle.

³ κινεῖται Vollgraf : κινεῖ Ruelle.

^a Aristotle's argument is somewhat obscure. In every ratio he regards one term as unity. Legitimate ratios appear to be of two kinds. a and b are in legitimate ratio (1) if $\frac{a}{b}$ is

PROBLEMS, XIX. 41-42

4 to 3, the extremes will have no ratio to each other^a; for the first term will be neither of the form 1 plus a fraction nor will it be a multiple of the second. But in an octave since the ratio is 2 to 1, when this is a double octave the extreme terms would be in the ratio of 4 to 1. Since, then, a consonance is of sounds which are rationally related to each other, and the sounds which cover the interval of the double octave are so related to each other, while those covering the intervals of the double fourth or double fifth are not, those composing the double octave would be consonant, but the others would not, for the reasons given above.

^b Why is it that, if one strikes the nete and then 42 stops it, only the hypate seems to sound? Is it because nete, when it is ceasing and dying away, becomes hypate? This is shown by the fact that it is possible to sing nete from hypate; for as it is a response to nete, they can gauge its similarity from it. But since an echo in a sense is a response to a note and, as nete dies away, an echo identical with the sound of hypate is set in motion, naturally because of its similarity nete seems to set hypate in motion. As for nete we know that it is not moving, because it is stopped down; but seeing that hypate is not stopped down, and hearing the sound of it, we suppose that it is sounding. This happens to us on many occasions on which we cannot attain to accurate knowledge either by reasoning or perception. Again a whole number, or (2) if $\frac{a}{b}$ is a fraction of the form $\frac{n+1}{n}$. The ratio of the octave 2 : 1 fulfils the requirements of (1), the ratio of the fifth 3 : 2 and the fourth 4 : 3 fulfil the requirements of (2); for $\frac{3}{2} = \frac{2+1}{2}$, and $\frac{4}{3} = \frac{3+1}{3}$. But the double fifth $\frac{9}{4}$ and the double fourth $\frac{16}{9}$ fulfil neither.

^b Cf. Problem 24.

921 b

πληγείσης τῆς νεάτης μάλιστα ἐντεταμένης συμβαίνει τὸν ζυγὸν κινεῖσθαι, οὐθὲν ἂν εἶη θαυμαστόν. κινηθέντος δὲ πάσας τὰς χορδὰς συγκινεῖσθαι καὶ τιν' ἦχον ποιεῖν οὐκ ἄλογον. ταῖς μὲν οὖν ἄλλαις
 30 ὁ τῆς νεάτης φθόγγος ἀλλότριός ἐστιν καὶ λήγων καὶ ἀρχόμενος, τῇ δὲ ὑπάτῃ λήγων ὁ αὐτός. οὐ προστεθέντος τῇ ἰδίᾳ αὐτῆς κινήσει, ἐκείνης δόξαι πάντ' αὐτὸν εἶναι οὐθὲν ἄτοπον. ἔσται δὲ μείζων ἢ ὁ κοινὸς τῶν λοιπῶν χορδῶν ἦχος, ὅτι αἱ μὲν ὑπὸ τῆς νεάτης καθάπερ ὠσθεῖσαι μαλακῶς ἤχησαν,
 35 ἢ δὲ νεάτη πάσῃ τῇ αὐτῆς δυνάμει, οὔσα αὐτῶν σφοδροτάτη. ὥστε εἰκότως καὶ τὸ δευτερεῖον αὐτῆς κρείττον ἂν εἶη ἢ τὸ τῶν ἄλλων· ἄλλως τε καὶ βραχείας κινήσεως αὐταῖς γεγενημένης.¹

922 a

Διὰ τί ἡδίων τῆς μονωδίας ἀκούομεν² εἴαν τις 43 πρὸς αὐλὸν ἢ λύραν ἄδῃ; ἢ ὅτι πᾶν τῷ ἡδίονι μίχθῃν ἡδίων ἔτι³ ἐστί; ὁ δὲ αὐλὸς ἡδίων τῆς λύρας, ὥστε καὶ ἡ ὠδὴ τούτῳ μίχθεισα ἢ λύρα ἡδίων ἂν
 5 εἶη, ἐπεὶ τὸ μεμιγμένον τοῦ ἀμίκτου ἡδίων ἐστιν, εἴαν ἀμφοῖν ἅμα τὴν αἴσθησίν τις λαμβάνῃ. οἶνος γὰρ ἡδίων τοῦ ὀξύμέλιτος διὰ τὸ μεμίχθαι μᾶλλον αὐτοῖς τὰ ὑπὸ τῆς φύσεως μίχθέντα ἢ ὑφ' ἡμῶν. ἐστί γὰρ καὶ οἶνος ὁ μικτὸς ἐξ ὀξέος καὶ γλυκέος
 10 χυμοῦ. δηλοῦσι δὲ καὶ αἱ οἰνώδεις ῥοαὶ καλούμεναι. ἢ μὲν οὖν ὠδὴ καὶ ὁ αὐλὸς μίγνυνται αὐτοῖς δι' ὁμοιότητα (πνεύματι γὰρ ἄμφω γίνεται). ὁ δὲ τῆς λύρας φθόγγος, ἐπειδὴ οὐ πνεύματι γίνεται ἢ

¹ ms. reading is ὥστε καὶ βραχείας κινεῖσθαι, ὡς αὐτῆς τε. This is meaningless. Th. G. seems to translate the above reading as restored by Sylburg.

² Reading ἀκούομεν X^a: ἐστὶν Ruelle.

³ τῷ ἡδίονι μίχθῃν ἡδίων ἔτι Forster: τὸ ἡδίων μίχθῃν ἡδίονι ἐν Ruelle.

PROBLEMS, XIX. 42-43

there would be no cause for surprise if, when nete which is tightly stretched is struck, the bridge also moved. Nor again would it be strange if when the bridge moves all the strings should move with it and produce a sound. Now the sound of the nete is foreign to the others both at the end and at the beginning of the note, but it is the same as the hypate at the end. When this is added to the movement of the hypate itself, it is not at all surprising that it should seem to be entirely that note. Also it will be louder than the combined sound of the other strings, because those set in motion by the nete being so to speak driven by it only sound softly, but nete sounds with full strength, because it is the most violent note of them all. So naturally its secondary effect would be louder than that of the others; especially if only a small movement has been imparted to them.

Why is it that a solo is more pleasant to our ears 43 if one sings to the accompaniment of the flute than if one sings to the lyre? Is it because everything is still more pleasant when mixed with something else which is more pleasant? The flute is more pleasant than the lyre, so that a song blending with it would be more pleasant than when blended with the lyre, since the mixed is pleasanter than the unmixed, if one can achieve perception of both elements at the same time. For wine is pleasanter than oxymel because things mixed by nature are more completely blended than when mixed by us. For wine is a mixture of bitter and sweet flavour. The so-called wine-pomegranates^a prove this. So the song and the flute blend with each other because of their similarity (for both are due to the breath); but the sound of the lyre, either because it is not produced by breath or because it is

^a Probably "pomegranates with a vinous taste." Theophrastus refers to "vinous fruits."

922 a

ἤττον αἰσθητὸν ἢ ὁ τῶν αὐλῶν, ἀμικτότερός ἐστι
 τῆ φωνῆ· ποιῶν δὲ διαφορὰν τῆ αἰσθήσει ἤττον
 ἠδύνει, καθάπερ ἐπὶ τῶν χυμῶν εἴρηται. ἔτι ὁ μὲν
 15 αὐλὸς πολλὰ τῷ αὐτοῦ ἤχῳ καὶ τῆ ὁμοιότητι συγ-
 κρύπτει τῶν τοῦ ὕδου ἀμαρτημάτων, οἱ δὲ τῆς
 λύρας φθόγγοι ὄντες ψιλοὶ καὶ ἀμικτότεροι τῆ
 φωνῆ, καθ' ἑαυτοὺς θεωρούμενοι καὶ ὄντες αὐτοῖ¹
 συμφανῆ ποιούσιν τὴν τῆς ὕδης ἀμαρτίαν, καθάπερ
 κανόνες ὄντες αὐτῶν. πολλῶν δὲ ἐν τῆ ὕδῃ ἀμαρ-
 20 τανομένων, τὸ κοινὸν ἐξ ἀμφοῖν ἀναγκαῖον χεῖρον
 γίνεσθαι.

Διὰ τί τῶν μὲν ὀκτῶ μέση καλεῖται, τῶν δὲ ὀκτῶ 44
 οὐκ ἔστι μέσον; ἢ ὅτι ἐπτάχορδοι ἦσαν αἱ ἀρ-
 μονίαι τὸ παλαιόν, τὰ δὲ ἐπτὰ ἔχει μέσον; ἔτι
 ἐπειδὴ τῶν μεταξύ τῶν ἄκρων τὸ μέσον μόνον
 25 ἀρχὴ τίς ἐστίν (ἔστιν τῶν <εἰς> θάτερον τῶν ἄκρων
 νευόντων ἐν τινι συστήματι ἀνὰ μέσον ὃν ἀρχή),
 τοῦτ' ἔσται μέσον. ἐπεὶ δ' ἔσχατα μὲν² ἐστίν
 ἀρμονίας νεάτη καὶ ὑπάτη, τούτων δὲ ἀνὰ μέσον
 οἱ λοιποὶ φθόγγοι ὧν ἡ μέση καλουμένη μόνη
 ἀρχὴ ἐστὶ θατέρου τετραχόρδου, δικαίως μέση
 30 καλεῖται. τῶν γὰρ μεταξύ τινων ἄκρων τὸ μέσον
 ἦν ἀρχὴ μόνον.

Διὰ τί οἱ πολλοὶ ἄδοντες σώζουσι μᾶλλον τὸν 45
 ῥυθμὸν ἢ οἱ ὀλίγοι; ἢ ὅτι μᾶλλον πρὸς ἓνα τε καὶ
 ἠγεμόνα βλέπουσι, καὶ βραδύτερον ἄρχονται, ὥστε
 ῥᾶον τοῦ αὐτοῦ τυγχάνουσιν; ἐν μὲν γὰρ τῷ τάχει
 35 πλείων γίνεται ἡ ἀμαρτία, συμβαίνει δὲ τῷ
 ἠγεμόνι προσέχειν τοὺς πολλούς· ἰδιαζόμενος δὲ

¹ αὐτοῖ W. D. Ross : αὐτοῖς Ruelle.

² μὲν Usener : μέσον Ruelle.

PROBLEMS, XIX. 43-45

less perceptible than the sound of the flute, blends less well with the voice ; and, because it presents a difference to the perception, it gives less pleasure, as has been said in the case of flavours. In addition to this, the flute by its own sound and its similarity (to the voice) masks many of the mistakes in the song, but the sounds of the lyre, being isolated and not blending so well with the voice, being noticed separately and actually being separate, make a mistake in the song obvious, acting as criteria of them. If, then, there are many mistakes in the song, the combination of the two (lyre and voice) must be worse.

Why is one string of the octave called " mese," ⁴⁴ when there is no middle note to eight ? Is it because in the old days the modes were on seven strings, and seven has a middle note ? Again, since of all the notes between the extremes the middle one alone is in a sense a starting-point (for in any arrangement of notes which incline to one or other of the extremes, one in the middle is a starting-point), mese will be in a middle position. But since the extremes of the scale are nete and hypate, and the remaining sounds lie between them, of which the so-called mese is alone the starting-point of the next tetrachord, it is right that it should be called mese. For, as we have seen, of the notes between two extremes the middle alone is a starting-point.

^a Why do many singing together keep time better ⁴⁵ than a few ? Is it because they pay better attention to one man, their leader, and begin with more deliberation, so that they more easily strike the same moment ? For the error is usually due to haste, but a large number pay more attention to the leader ;

^a Cf. Problem 22.

922^a οὐδείς ἂν αὐτῶν διαλάμψειεν ὑπεράρας τὸ πλῆθος.
 ἐν δὲ τοῖς ὀλίγοις μᾶλλον διαλάμπουσιν· διὸ καθ'
 αὐτοὺς ἐν αὐτοῖς μᾶλλον ἀγωνίζονται ἢ πρὸς τὸν
 ἡγεμόνα.

Διὰ τί ἐπὶ τὸ ὄξυ ἀπάδουσιν οἱ πλείστοι; ἢ ὅτι 46
 922^b ῥᾶον ὄξυ ᾄσαι ἢ βαρὺ; ᾄδουσι γοῦν ὄξυ μᾶλλον,
 καὶ ἐν ᾧ ᾄδουσι, ἀμαρτάνουσιν.

Διὰ τί οἱ ἀρχαῖοι ἐπταχόρδους ποιοῦντες τὰς 47
 ἀρμονίας τὴν ὑπάτην, ἀλλ' οὐ τὴν νήτην κατέλιπον;
 5 ἢ οὐ τὴν ιήτην, ἀλλὰ τὴν νῦν παραμέσσην καλου-
 μένην ἀφήρουν καὶ τὸ τονιαῖον διάστημα; ἐχρῶντο
 δὲ μέσση τῇ ἐσχάτῃ¹ τοῦ ἐπὶ τὸ ὄξυ πυκνοῦ· διὸ καὶ
 μέσσην αὐτὴν προσηγόρευσαν. ἢ ὅτι ἦν τοῦ μὲν
 ἄνω τετραχόρδου τελευτή, τοῦ δὲ κάτω ἀρχή, καὶ
 μέσον εἶχε λόγον τόνω τῶν ἄκρων;

10 Διὰ τί οἱ ἐν τραγωδίᾳ χοροὶ οὔθ' ὑποδωριστὶ οὔθ' 48
 ὑποφρυγιστὶ ᾄδουσιν; ἢ ὅτι μέλος ἠκιστα ἔχουσιν
 αὐταὶ αἱ ἀρμονίαι, οὐ δεῖ μάλιστα τῷ χορῷ; ἦθος
 δὲ ἔχει ἢ μὲν ὑποφρυγιστὶ πρακτικόν, διὸ καὶ ἐν
 [τε] τῷ Γηρυόνη ἢ ἔξοδος καὶ ἢ ἐξόπλισις ἐν ταύτῃ
 15 πεποιήται, ἢ δὲ ὑποδωριστὶ μεγαλοπρεπὲς καὶ
 στάσιμον, διὸ καὶ κιθαρῳδικωτάτη ἐστὶ τῶν ἀρ-
 μονιῶν. ταῦτα δ' ἄμφω χορῷ μὲν ἀνάρμοστα, τοῖς
 δὲ ἀπὸ σκηνῆς οἰκειότερα. ἐκεῖνοι μὲν γὰρ ἠρώων
 μιμηταί· οἱ δὲ ἡγεμόνες τῶν ἀρχαίων μόνοι ἦσαν
 ἠρωες, οἱ δὲ λαοὶ ἄνθρωποι, ὧν ἐστὶν ὁ χορός. διὸ

¹ μέσση τῇ ἐσχάτῃ Jan : τῇ ἐσχάτῃ μέσση Ruelle.

^a The " pycnum " in the chromatic and enharmonic scales is a system of three notes, complementary to the tetrachord and above it.

and none of them would become conspicuous by drowning the rest. But among a small number men are more liable to make themselves conspicuous; for they compete among themselves rather than look to their leader.

Why do most men sing sharp? Is it because a ⁴⁶ high note is easier than a low one? They are at any rate more inclined to sing high and so make mistakes in what they sing.

Why did the ancients, when they constructed the ⁴⁷ seven-note scales, leave hypate but not nete? Or did they omit not nete, but the note which we now call paramese and the tone interval? So they used mese as the last note of the upper "pycnum,"^a which is the reason why they called it mese. Or is it because this note was the end of the upper tetrachord, and the beginning of the lower, and was intermediate in pitch between the extremes?^b

Why do choruses in Tragedy sing neither in the ⁴⁸ hypodorian nor in the hypophrygian mode? Is it because these modes have least melody, which is most necessary to the chorus? The hypophrygian mode has the character of action; for this reason the *sortie* and the *arming* in the *Geryone* are both written in this mode; but the hypodorian has a high sounding and steady character; this is why it is of all the modes that most suited to the lyre. But both these modes are inappropriate to the chorus, and more suitable to actors on the stage. For the characters on the stage are imitating heroes; and in the old days only the leaders were heroes, but the rest of the folk, to whom the chorus belong, were only men. So a

^b *i.e.* "which sound a fourth with these two strings" (Ruelle).

922 b

20 καὶ ἀρμόζει αὐτῷ τὸ γοερὸν καὶ ἡσύχιον ἦθος καὶ μέλος· ἀνθρωπικὰ γάρ. ταῦτα μὲν ἔχουσιν αἱ ἄλλαι ἀρμονίαι, ἡκιστα δὲ αὐτῶν ἢ φρυγιστί· ἐνθουσιαστική γὰρ καὶ βακχική. κατὰ μὲν οὖν ταύτην πάσχομέν τι· παθητικοὶ δὲ οἱ ἀσθενεῖς μᾶλλον τῶν δυνατῶν εἰσί, διὸ καὶ αὕτη ἀρμόττει τοῖς χοροῖς·
 25 κατὰ δὲ τὴν ὑποδωριστί καὶ ὑποφρυγιστί πράττομεν, ὃ οὐκ οἰκείον ἐστὶ χορῷ. ἔστι γὰρ ὁ χορὸς κηδευτῆς ἀπρακτος· εὐνοίαν γὰρ μόνον παρέχεται οἷς πάρεστιν.

Διὰ τί τῶν τὴν συμφωνίαν ποιούντων φθόγγων 49 ἐν τῷ βαρυτέρῳ τὸ μαλακώτερον; ἢ ὅτι τὸ μέλος τῆ μὲν αὐτοῦ φύσει μαλακόν ἐστὶ καὶ ἡρεμαῖον, τῆ δὲ τοῦ ρυθμοῦ μίξει τραχὺ καὶ κινητικόν; ἐπεὶ δὲ ὁ μὲν βαρὺς φθόγγος μαλακὸς καὶ ἡρεμαῖός ἐστιν, ὁ δὲ ὀξύς κινητικός, καὶ τῶν ταῦτὸ μέλος ἐχόντων εἴη ἂν μαλακώτερος ὁ βαρύτερος ἐν ταῦτῷ μέλει μᾶλλον· ἦν γὰρ τὸ μέλος αὐτὸ¹ μαλακόν.

35 Διὰ τί ἴσων πίθων καὶ ὁμοίων, εἴαν μὲν ὁ ἕτερος 50 κενὸς ἦ, ὁ δὲ ἕτερος εἰς τὸ ἡμισυ διάμεστος, διὰ πασῶν συμφωνεῖ ἢ ἡχώ; ἢ ὅτι διπλασία γίνεται [καὶ] ἢ ἐκ τοῦ ἡμίσεος τῆς ἐκ τοῦ κενοῦ; τί γὰρ διαφέρει τοῦτο ἢ ἐπὶ τῶν συρίγγων; δοκεῖ γὰρ ἢ θάπτων κίνησις ὀξυτέρα εἶναι, ἐν δὲ τοῖς μείζουσι βραδύτερον ὁ ἀήρ ἀπαντᾷ, καὶ ἐν τοῖς διπλασίοις τοσοῦτῳ, καὶ ἐν τοῖς ἄλλοις ἀνάλογον. συμφωνεῖ δὲ διὰ πασῶν καὶ ὁ διπλασίων ἀσκὸς πρὸς τὸν ἡμισυν.

PROBLEMS, XIX. 48-50

mournful and quiet character and melody are appropriate to them ; for these are human. Now the other modes have such character, but the hypophrygian to the smallest extent ; for it is prone to raise inspired and bacchic frenzy. In this mode, therefore, we are affected in a certain way, and the weak are more easily affected than the strong, so that this mode is appropriate to choruses ; but under the influence of the hypodorian and hypophrygian modes we are inclined to action which is not appropriate to the chorus. For the chorus is an inactive watcher of events ; for its only function is to display a friendly attitude to those who are on the stage at the same time.

Why is it that of the sounds composing a harmony 49 the softer is the lower note ? Is it because the melody is of its own nature soft and quiet, but by the blending of the rhythm becomes harsh and moving ? Since, then, the lower note is soft and quiet, but the higher note is moving, it follows that of the two notes producing the same tone the lower note would be softer in the same tune ; for the melody itself is, as we have seen, soft.

Why is it that if we take two similar vessels of the 50 same size, if the one is empty and the other is half full, the (combined) sound gives an octave consonance ? Is it because the sound of the half-full vessel is double that of the empty vessel ? For what difference is there between these conditions and those in pipes ? For the quicker motion seems to give a higher note, and the air meets one at a slower rate in larger spaces. If the space is double then the time taken is double, and proportionately in other cases. So too a wine skin of double size gives an octave consonance with one of half the size.

Κ

923 a 5 ΟΣΑ ΠΕΡΙ ΘΑΜΝΟΥΣ ΚΑΙ ΛΑΧΑΝΩΔΗ

Διὰ τί τὸ ἀλυκὸν ὕδωρ τὰ μὲν σέλινά δέχεται, 1
τὸ δὲ πράσον οὐ; ἢ ὅτι τοῦ μὲν ἀσθενεῖς αἱ ρίζαι,
τοῦ δὲ ἰσχυραί; τὸ δὲ ἰσχυρότερον ἀπαθέστερον.

Διὰ τί λέγεται “ μίνθην ἐν πολέμῳ μήτ’ ἔσθιε 2
10 μήτε φύτευε ”; ἢ ὅτι καταψύχει τὰ σώματα;
δηλοῖ δὲ ἢ τοῦ σπέρματος φθορά. τοῦτο δὲ
ὑπεναντίον πρὸς ἀνδρείαν καὶ θυμὸν ταῦτόν ὄν τῷ
γένει.

Διὰ τί ἔνια ἄνθος ἔχοντα ἄκαρπά ἐστίν, οἶον 3
σίκυος καὶ κολόκυνθα καὶ ρόα; ἢ οὐκ ἄκαρπα,
15 ἀλλὰ ταῦτα καρπὸς ἐστίν; περικάρπιον γοῦν ἐστὶ
τὸ ἀνθοῦν, ὃ δὲ σίκυος περικάρπιον.

Διὰ τί τῶν φυομένων τὰ μὲν ἐψανά, τὰ δὲ 4
ὠμὰ βρωτά; ἢ ὅσων οἱ χυμοὶ μὴ εὐθύς ἐδώδιμοι,
τούτων πυρωθέντων γλυκύτεροι γίνονται ὑπὸ τοῦ
20 θερμοῦ, ὅσων δὲ εὐθύς, καὶ ὠμὰ ἐδώδιμα;

Διὰ τί τὰ μὲν ἐψανά, τὰ δὲ ὀπτανά; ἢ ὅτι τὰ 5
μὲν ὑγρότερα οὐ τοσοῦτον, τὰ δὲ ξηρότερα οὐ
μᾶλλον ξηρανθῆναι δεῖ; ἐψόμενα δὲ πάντα ὑγρό-
τερα καὶ μαλακώτερα. τὰ δὲ ἥττον ὑγρά, ἂν
πυρωθῆ, γίνεται ξηρά.

BOOK XX

PROBLEMS CONNECTED WITH SHRUBS AND PLANTS

WHY does parsley stand salt water, while leeks do not? Is it because in the latter plant the roots are weak and in the former strong? But the stronger is less affected.

What is the meaning of the saying "Neither eat nor plant mint in war time"? Is it because it has a chilling effect on the body? Its corruption of semen proves this. And this being similar in nature is contrary to courage and high temper.

Why do some plants which bear flowers have no fruit, such as gourds, pumpkins and pomegranates? Or are they not fruitless, and are the flowers the fruit? For the flowering part is the seed envelope, and the cucumber is a seed envelope.

Why are some vegetables eaten cooked and some raw? Is it true that the sap of some is not directly edible, but that when they are put in the fire the juices are made sweeter by the heat, but that those which are at once edible are eaten raw?

Why are some vegetables boiled and others roasted? Is it because some being moist are not dry enough, but the drier ones must not be dried any further? For everything becomes moister and softer by being boiled. But if the less moist are put in the fire they become dry.

923 a

25

Διὰ τί δὲ τὰ μὲν ἄβρωτά ἐστι, τὰ δὲ βρωτά; ἢ ὅτι
 διὰ τοὺς χυμούς; ὅσα γὰρ καὶ ὠμὰ ἀπέπτους ἔχει
 καὶ πυρούμενα μὴ μεταβάλλει, ἄβρωτα. ὅσων δὲ
 βρωτὸς μὲν ὁ χυμὸς ἰσχυρότερος δέ, ταῦτα ἡδύ-
 σματά ἐστιν· τὰ γὰρ ἐν μικρῷ ἔχοντα πολλὴν
 δύναμιν τῶν βρωτῶν ἡδυντικὰ τῶν ἐν πολλῷ.

30

Διὰ τίνα αἰτίαν τὰ μὲν μέχρι σπέρματος τῶν
 φυτῶν ζῆ, εἶτα ἐνεγκόντα αὐαίνεται, οἷον ἢ πόα
 καὶ τὰ καλούμενα λάχανα, τὰ δὲ οὐ, ἀλλὰ πολλάκις
 φέρει; καὶ τῶν μέχρι σπέρματος ζώντων τὰ μὲν
 πολλὰ ἐπέτεια, τὸ δὲ ἵπποσέλινον τῷ ὑστέρῳ ἔτει
 φέρει καρπὸν, καὶ ἐνέγκαν ἐξαυαίνεται· ἢ ἅπαντα
 μὲν μέχρι τούτου ἀκμάζει, ἕως ἂν κατὰ τὸ σπέρμα
 ἀκμάζη; ἐπεὶ καὶ οἱ ἄνθρωποι μέχρι τριάκοντα
 ἐτῶν ἐπιδιδόασιν, ὅτε μὲν τῷ πλήθει, ὅτε δὲ τῇ
 παχύτητι. ὅταν δὲ μηκέτι δύνηται φέρειν, ὥσπερ
 ἐκεῖ, αὐαίνεται καὶ καταγηράσκει· τὰ δὲ βραδέως
 καὶ κατὰ λόγον. δι' ἣν μὲν οὖν αἰτίαν τὰ μὲν
 βραχύβια, τὰ δὲ μακρόβιά ἐστιν, ἄλλος ἔστω λόγος·
 ἐπεὶ δ' ἔστιν πᾶσιν ὄρος ἢ τοῦ σπέρματος τελείωσις,
 ἀνάγκη τοῖς μὲν βραχυβίοις ἅπαξ ἢ ὀλιγάκις ἐνεγ-
 κεῖν καρπὸν, τοῖς δὲ μακροβίοις πολλάκις, ὥστε
 τὰ μὲν ἀσθενέστατα ἅπαξ ἐνεγκεῖν¹ (διὸ ἀνάγκη
 αὐαίνεσθαι). καὶ τούτων τὰ μὲν δυνάμενα ἐνιαυτῷ
 ἐπέτεια εἶναι, τὰ δέ, ὥσπερ τὸ ἵπποσέλινον, τῷ
 ὑστέρῳ ἔτει, ὥσπερ τὰ δένδρα καὶ τὰ φυτά.

10

Διὰ τί σελίνου, εἴαν τις περιορύξας μέχρι κάτω
 πρὸς τὰς ρίζας περιβάλλῃ τῶν καχρυδίων, εἶτα
 ἄνωθεν τὴν γῆν, καὶ οὕτως ἄρδη, παμμεγέθεις
 γίνονται αἱ ρίζαι; ἢ διότι τὸ καχρύδιον θερμὸν

¹ ἐνεγκεῖν Bonitz : ἐνέγκοι Ruelle.

PROBLEMS, XX. 6-8

Why are some plants inedible and others edible? 6
Is it due to their juices? For those which when raw have unconcocted juices and do not change when heated are inedible. But those whose juice is edible but too strong are seasonings; for those plants which have a considerable flavour in a small compass are used for seasoning those foods whose flavour is distributed over a large area.

Why do some plants live until the seed-time, and 7
then after bearing seed wither away, such as grass and so-called vegetables, but some do not, but bear many times? And why of those which live only up to seed-time are the larger number annuals, but the horse-parsley bears fruit in its second year and withers after bearing it? Or do they all flourish up to the point when they are at their prime as far as seed is concerned (for men also grow up to their thirtieth year, either in bulk or in fatness), but when they can no longer bear seed, as in the case of man, they wither and grow old, some slowly and at a steady rate? The reason why some are short-lived and some long-lived, is to be discussed elsewhere; but since the full development of the seed is the limit in all cases, it follows that the short-lived can only bear fruit once or a few times, but the long-lived a number of times, so that the weakest only bear fruit once (so they must wither); and those of them which can bear in a year only are annuals, but others, like the horse-parsley, bear in the second year, trees and plants alike.

Why is it that if one digs down as far as the roots 8
of celery and surrounds them with husks of barley, and then heaps the earth above and waters it, the roots grow extremely large? Is it because the husks

923 b ὄν καὶ σομφὸν κατέχει μὲν σύνολκον τὴν τροφήν
καὶ οὐ προΐεται ἄνω, πέττει δὲ θερμὸν ὄν, ὥστε
15 πολλὴν τὴν αὐξήσιν γίνεσθαι;

Διὰ τί, εἴαν τις τὰς κολοκύνθας εὐθύς μικρὰς ὄ-
ουσας κρύψη τῇ γῆ ἢ τοὺς σικύους, μείζους γί-
νονται; ἢ διότι τὰ πνεύματα καὶ ὁ ἥλιος ξηραί-
νοντα ἀφαιροῦνται τὴν αὐξήσιν, καὶ τοὺς ὄγκους
20 ἐλάττους μὲν ποιοῦσιν πάντων, στιφροτέρους δέ,
ὥσπερ καὶ τῶν δένδρων τὰ τε ἐν προσηνέμοις καὶ
εἰλώδεσιν¹ καὶ τὰ ἐν κοίλοις καὶ ἐφύδροις (τὰ μὲν
γὰρ μεγάλα γίνονται καὶ σομφά, τὰ δὲ μικρὰ καὶ
πυκνά). ἐν δὲ τῇ γῆ κρυφθέντα ἐναντία πάσχοντα
ἐναντίως ἀποβαίνει. ὁμοίως δὲ καὶ τὰ εἰς ἀγγεῖα
25 τιθέμενα, σίκυοι εἰς νάρθηκας κοίλους ἢ καλυ-
πτῆρας καὶ ῥοιαὶ καὶ μῆλα εἰς χύτρας, τὰ μὲν
μεγάλα σομφὰ δέ, οἱ δὲ μικροὶ στερροὶ (δέ), αὐξανό-
μενοι [μῆ]² εἰς ἀντίτυπον. αἰτία δὲ ἡ τροφή πλείων
γινομένη διὰ τὸ μήτε ἀποπνεῖσθαι, μήτε ξηραί-
νεσθαι· τὸ γὰρ ἀποστέγον κωλύει ταῦτα πάσχειν.

30 Διὰ τί τὰ σπέρματα τῶν δριμέων φυτῶν δρι- 10
μύτερά ἐστιν ἢ αἱ ρίζαι καὶ τὰ φύλλα; ἢ διότι ἐκ
τοῦ σπέρματος γίνεται ἅπαντα, καὶ εἰς τὰ ἄλλα
δίδοται μέρη ἐκ τούτου, οἷον εἰ ἐνυπάρχοντα, ὥς
φασί τινες, καὶ οἱ χυμοὶ καὶ αἱ ὀσμαί, ἐπεὶ καὶ αἱ
35 ὀσμαὶ ἴδιοι γίνονται ἅμα τοῖς σπέρμασιν ἅπασιν;
εἰ οὖν ἐκ τούτου καὶ τοῖς ἄλλοις ἢ δριμύτης
ὑπάρχει, εὐλογον καὶ αὐτὸ ὑπάρχειν μάλιστα.

Διὰ τί αἱ ῥαφανίδες αἱ λεπταὶ δριμύτεραι; ἢ 11
ὅτι αἱ μείζους διὰ τὸν χρόνον πεπεμμέναι μᾶλλον;

¹ εἰλώδεσι Forster : ἐλώδεσι Ruelle.

² Adding <δέ> and bracketing [μῆ].

PROBLEMS, XX. 8-11

being warm and porous retain the nutriment and do not let it rise, but concoct it because of the warmth, so that considerable growth results?

Why do pumpkins or gourds which are at first ⁹ small grow larger, if one buries them in the earth? Is it because wind and sun being drying agents prevent the growth, and make all plants smaller in bulk but harder, just as can be observed with trees in windy and sunny places, as opposed to hollow and wet places (for the latter grow big and porous, the former small and dense)? But when they are buried in the earth, suffering the contrary treatment, the results are contrary. A similar thing occurs with what is put into pots, (gourds in hollow fennel stalks or boxes, pomegranates and apples into earthenware jars) the latter grow large and porous, the former small and hard, since they grow against a resisting surface.^a The explanation is the larger quantity of food they receive, because it is neither blown away nor dried; for the covering prevents either of these things from happening.

Why are the seeds of the acrid plants more acrid ¹⁰ than either the roots or the leaves? Is it because everything grows from the seed, and a distribution takes place from it to all other parts of the plant, apparently existing in it from the beginning, as some claim, both juice and scent, since the scent of the plant always becomes distinctive at the same time as the seeds? If then the acrid taste which exists in the other parts develops from the seed, it is natural that it should exist there in particular.

Why are thin radishes more acrid? Is it because ¹¹ in the larger ones there is more concoction owing to length of time?

allusion to the practice of enclosing gourds in narrow receptacles so as to shape them for water-vessels.

924 3 Διὰ τί ἡ κάππαρις οὐκ ἐθέλει ῥαδίως ἐν τοῖς 12
 ἐργασίμοις γίνεσθαι χωρίοις (πολλοὶ γὰρ πεπεί-
 ρανται καὶ ῥίζας μεταφέροντες καὶ σπέρματα
 καταβάλλοντες· ἐνιαχοῦ γὰρ λυσιτελεῖ μάλλον τῶν
 5 ῥόδων), ἀλλὰ φύεται μάλιστα ἐπὶ τῶν τάφων, ὅτι
 ἀβατώτατος ὁ τόπος ἐστίν; περὶ δὲ δὴ τούτου
 καὶ ὅσα ἄλλα τοιαῦτα, δεῖ λαβεῖν ὅτι οὐχ ἅπαντα
 ἐκ τῆς αὐτῆς ὕλης γίνεται οὐδ' αὖξεται, ἀλλ' ἔνια
 ἐξ ἄλλων φθορᾶς καὶ ἐξ ἀρχῆς γίνεται καὶ αὖξά-
 νεται, οἷον οἱ φθειρες καὶ αἱ τρίχες ἐν τῷ σώματι
 10 διαφθειρομένης τῆς τροφῆς, καὶ αἰεὶ τὸ χεῖρον
 ἔχοντος. ὥσπερ οὖν καὶ τῶν ἐν σώματι ἔνια
 γίνεται ἐκ περιττώματος τροφῆς, τοῦτο δ' ἐστὶν
 ἀπεψία, καὶ οὐ μὴ ἐδύνατο κρατῆσαι ἢ φύσις, τὰ
 μὲν προχειρότατα εἰς κύστιν καὶ κοιλίαν ἀπο-
 κρίνεται, ἐξ ἐνίων δὲ ζῶα γίνεται, διὸ καὶ αὖξά-
 15 νονται ταῦτα ἐν γήρᾳ καὶ νόσοις, οὕτως ἐν τῇ γῇ
 τὰ μὲν ἐκ πεπεμμένης τῆς τροφῆς γίνεται καὶ
 αὖξάνεται, τὰ δὲ ἐκ περιττωμάτων καὶ ἐναντίως
 ἔχόντων. ἢ δὲ γεωργία πέττει καὶ ἐνεργὸν ποιεῖ
 τὴν τροφήν· ἐξ ἧς συνίστανται οἱ ἡμεροὶ καρποί.
 ἃ μὲν οὖν ἐκ τοιαύτης γίνεται ἡμερότητας, ἡμερα
 20 καλεῖται διὰ τὸ ἀπὸ τέχνης ὠφελεῖσθαι ὥσπερ
 παιδευόμενα· ὅσα δὲ μὴ δύναται ἢ καὶ ἐξ ἐναντίως
 ἔχοντος συνίσταται, ταῦτα ἄγριά ἐστιν καὶ οὐκ
 ἐθέλει γίνεσθαι ἐν γεωργησίμῳ. ἢ γὰρ γεωργία
 φθείρει αὐτὰ παιδεύουσα· ἐκ γὰρ φθορᾶς γίνεται.
 ὧν καὶ ἡ κάππαρίς ἐστίν.

Διὰ τί, ἐάν τις ῥαφανίδων, ὅταν μάλιστα ἀκμά- 13
 25 ζῶσι τοῦ χειμῶνος, ἀποτεμῶν τὰ φύλλα περισάξῃ
 τὴν γῆν καὶ καταπατήσῃ ὥστε ἀποστέγειν τὸ
 ὕδωρ, αὐταὶ ἐν τῷ θέρει γίνονται ἄπλετοι τὸ

Why will not the caper plant grow easily in cultivated ground (for the attempt has often been made by transplanting roots or sowing seed; for in some places it is more profitable than rose-growing), but it grows best on graves, because the ground is untrodden? In this connexion and in all similar cases it must be realized that not everything is born or grows from the same matter, but some things originate and grow from the decay of others, such as lice and hair on the body when the nourishment is corrupted, and the condition of the body grows steadily worse. As then in the body some things grow from the waste product of food (that is, concoction is incomplete) and, where nature cannot prevail, the commonest waste-products are secreted into the bladder and stomach, while from others living organisms are generated (hence these parts increase in size in old age and disease), so too in the earth some organisms come into existence and grow from the concocted nutriment, but others from waste products, which are the exact opposite of nutriment. Now tilling the ground concocts the nutriment and makes it active; from this cultivated fruits grow. Things which grow from such cultivation are called cultivated because they derive benefit from the skill expended on them, as if they were trained; but those which cannot be cultivated or are formed from an opposite treatment, these are wild and will not grow in tilled soil. For husbandry ruins these by training them; for they are bred from corruption. One of these is the caper plant.

Why is it that if one cuts off the leaves of radishes, when they are in full growth during the winter, and then piles soil round them and treads it down, so as to exclude the moisture, the plants develop an astonishing growth in the summer? Is it because

924^a πάχος; ἢ ὅτι τοῦ μὲν μὴ φθείρεσθαι τὸ περι-
σεσάχθαι αἴτιον, κωλύον τὸ ὕδωρ σήπειν; ἢ δὲ
τροφή, ἣν ἄνω ἀφίει εἰς τὸν βλαστόν, εἰσέρχεται
30 εἰς αὐτήν, ὥστε ἀνάγκη αὐτὴν μείζω γίνεσθαι ἢ
ἀφιέναι παραβλαστάνουσιν ἄλλας ρίζας, ὥσπερ
τὰ κρόμμυα. καὶ γὰρ ταῦτα, εἴαν μὴ τις ἐκτίλη
ἐπέτεια, ἀλλ' ἐάσῃ τὸν χειμῶνα, πολλαπλάσια
γίνεται. τὰ μὲν οὖν κρόμμυα τῶν παραβλαστα-
νότων ἐστίν, ἢ δὲ ῥάφανος οὐ, ὥστε ἀνάγκη
35 αὐτὴν γίνεσθαι παχεῖαν διὰ τὸ πᾶσαν λαμβάνειν
τὴν τροφήν.

Διὰ τί, εἴαν τις σικύους ἢ κολοκύνθας περὶ φρέαρ 14
φυτεύσας, ὅταν ὠραῖοι ὦσι, καθεὶς εἰς τὸ φρέαρ
ἀποστεγάσῃ, γίνονται δι' ἔτους χλωροί; ἢ διότι
ἢ τε ἀπὸ τοῦ ὕδατος ἀτμὶς ψύχουσα κωλύει
924^b ξηραίνεσθαι καὶ παρέχει θάλλοντα, καὶ τὸ ἀπο-
στέγειν τούτους καὶ τὰ πνεύματα τρέφει τὰ ηὔξη-
μένα; τοῦ δὲ διαμένειν αἴτιον τὸ ἔχειν τροφήν
ἐωμένων τῶν ριζῶν. καὶ γὰρ εἴαν τις ἀφελὼν τὴν
βλάστην, ὅταν καρποφορήσωσι, καὶ ἀποτεμὼν περι-
5 σάξῃ καὶ καταπατήσῃ τὴν γῆν περὶ τὰς ρίζας,
πρωῖμους οἴσει σικύους, ὡς δυναμένων σώζεσθαι
τῶν ριζῶν· οὐ γὰρ ἔσται σίκυος τῶν προετείων.
θᾶπτον δὲ αὐτοὶ τῶν σπειρομένων οἴσουσι καρπὸν
διὰ τὸ πολὺ προῦπάρχειν τοῦ ἔργου τῇ φύσει τὰς
ρίζας, τοῖς δὲ σπειρομένοις δεῖν γίνεσθαι τοῦτο
πρῶτον· ἔτι δὲ ἢ περίσαξις ἀλέαν ποιεῖ,¹ ὥστε σώ-
10 ζεσθαι καὶ θᾶπτον ἐνιέναι βλαστόν. διὸ καὶ εἴαν
τις χειμῶνος φυτεύσῃ σπέρμα σικύου ἐν ταλαρί-
σκοις καὶ ἄρδηται θερμῶ καὶ εἰς τὸν ἥλιον ἐκφέρῃ
καὶ παρὰ πυρὶ τιθῇ, πρωῖμοι σφόδρα ἔσονται, εἴαν

¹ ἔτι δὲ ἢ περίσαξις Forster : ἐν ἡ περισάξεις Ruelle.

the packing of the soil prevents the plant's decay, because it prevents the water from causing rot? The food which the plants used to send up into the shoot, enters into the radish, so that it must either itself increase in size or push out other lateral roots as onions do. These, if one does not pluck them off each year but lets them lie throughout the winter, multiply exceedingly. For the onion belongs to the class of plant which puts out lateral roots, but the radish does not, so that the radish itself must of necessity grow large because it receives all the nourishment.

Why is it that if one plants gourds and pumpkins 14 near a cistern, and puts them into the cistern when they are in bloom and covers them up, they remain green throughout the year? Is it because the water vapour by keeping them cool prevents them from drying up and keeps them green, and covering them up preserves the breath which has increased in them? The reason of their permanence is that, so long as their roots are undisturbed, they still receive nourishment. For even if one cuts off the shoot, when they have finished bearing fruit, and after cutting it off piles up the soil and treads it down about the roots, the plant will bear early gourds, because the roots can be preserved; for the gourd is not a biennial. The plants themselves will bear fruit more quickly than from seed, because the important part of the plant—the roots—is present already in their growth, whereas in seedlings this part must grow first; also the piling up of the soil produces heat, so that the plant is preserved and sends up a shoot more quickly. So also if one sows the seed of a gourd in a basket in winter, and waters it with warm water, and takes it out into the sun and places it by the fire, gourds

^{924 b} ὡς ἔχει ἐν τοῖς ταλάροις εἰς τὴν ἰκνουμένην ὤραν
εἰς τὴν γῆν φυτεύση.

15 Διὰ τί ἀρδεύουσιν ἔωθεν ἢ νυκτὸς ἢ δειλῆς; 15
πότερον ἵνα μὴ ὁ ἥλιος ἀναλώσῃ; ἢ ὅτι, εἰαν ἢ
θερμὸν τὸ ὕδωρ, διαφθείρει τὰ ἀρδόμενα;

Διὰ τί τὰ εὐώδη οὖρητικά, καὶ σπέρματα καὶ 16
φυτά; ἢ ὅτι θερμὰ καὶ εὐπεπτα, τὰ δὲ τοιαῦτα
20 οὖρητικά· ταχὺ γὰρ λεπτύνει ἢ ἐνοῦσα θερμότης,
καὶ ἢ ὁσμὴ οὐ σωματώδης, ἐπεὶ καὶ τὰ μὴ εὐώδη,
οἶον σκόροδα, διὰ τὴν θερμότητα οὖρητικά, μᾶλλον
μέντοι συντηκτικά. θερμὰ δὲ τὰ εὐώδη σπέρματα,
διότι ὅλως ἢ ὁδμὴ διὰ θερμότητά τινα γίνεται·
ἀλλὰ τὰ δυσώδη ἄπεπτά ἐστιν. δεῖ δὲ μὴ μόνον
25 εἶναι θερμά, ἀλλὰ καὶ εὐπεπτα, εἰ ἔσται οὖρητικά,
ὅπως συγκατιόντα λεπτύνῃ τὰ ὑγρά.

Διὰ τί θᾶπτον ἐκκαυλεῖ τῶν λαχάνων τὰ ἐκ 17
παλαιότερου σπέρματος, οἶον τριετοῦς ἢ διετοῦς,
ἢ τὰ ἐκ τῶν προσφάτων; ἢ ὅτι ὡς ἐπὶ τῶν ζώων
30 θᾶπτον σπέρμα φέρει τὸ ἀκμάζον, οὕτω καὶ τῶν
σπερμάτων τὰ μὲν λίαν παλαιὰ ἐξίκμασται τὴν
δύναμιν, τὰ δὲ ἀσθενέστερα διὰ τὸ ἔτι ἔχειν περίτ-
τωμα μὴ οἰκείον, τὰ δὲ μέσα τῷ χρόνῳ ἰσχυρότατα
ἀπεληλυθότος τοῦ ὑγροῦ· θᾶπτον οὖν σπέρμα φέρει;
τὸ δὲ ἐκκαυλεῖν τοῦτό ἐστιν· ἐκ γὰρ τοῦ καυλοῦ
τὸ σπέρμα.

35 Διὰ τί πήγανον κάλλιστον καὶ πλεῖστον γίνεται 18
εἰάν τις ἐκφυτεύσῃ εἰς συκῆν; ἐκφυτεύεται δὲ
περὶ τὸν φλοιὸν καὶ περιπλάττεται πηλῷ. ἢ ὅτι

PROBLEMS, XX. 14-18

will appear very early if one plants them out into the soil in baskets just as they are, when the season comes.

Why is watering done either in the early morning, 15 or at night or in the evening? Is it that the sun may not exhaust the moisture? Or is it because, if water grows hot, it ruins what is watered?

Why are sweet-scented seeds and plants diuretic? 16 Is it because they are warm and easily concocted, and such things are diuretic? For the heat in them quickly causes digestion, and the scent is not corporeal, since even the unpleasant-smelling plants, such as garlic, are diuretic because of their warmth, though their wasting effect is still more marked. The sweet-smelling seeds are all hot, because, speaking generally, scent is due to heat; but the evil-smelling are not easily digested. If, then, they are to be diuretic they must be not only hot but also easily concocted, so that as they descend they may digest the moist elements.

Why do plants grown from old seed, say two or 17 three years old, run to stalk more quickly than those grown from fresh seed? Is it because, as in animals, the seed in its prime bears more quickly, so also the seeds which are too old have their strength dried up, but the fresh seeds are weaker because they still contain waste product which does not belong to them, while those intermediate in time are strongest because the moisture has left them; so they bear seed more quickly? This is running to stalk; for the seed arises from the stalk.

Why does rue grow finest and best if one grafts it 18 on to a fig-tree? It is grafted on to the bark and plastered round with clay. Is it because the roots of

924^b θερμότητος δέονται αἱ ρίζαι τοῦ πηγάνου καὶ ἀλέας
 (διὸ καὶ τὴν τέφραν ἐάν τις περιβάλλῃ, ὀνίνανται),
 925^a ἢ δὲ συκῆ θερμὴ ἐστίν; δηλοῖ δὲ καὶ ὁ ὀπὸς
 πάντων δριμύτατος ὢν, καὶ ὁ πολὺς καπνός. ἔχει
 οὖν τοιαύτην θερμότητα καὶ ἰκμάδα οἷαν καὶ ἡ
 τέφρα, ὥστε εἰ ἐκείνη ὀνίνησιν, ἀναγκαῖον καὶ ἐν
 τῇ συκῇ μάλιστα εὐσθενεῖν, ὅσω ἢ μὲν τέφρα οὐκ
 5 ἐπιρρεῖ, τὸ δ' ἀπὸ τῆς συκῆς αἰεὶ ἐπιρρεῖ, οὐκ
 ἀναλισκομένου τοῦ ὑγροῦ τῇ συκῇ.

Διὰ τί ἔνια τῶν φυτῶν αἰεὶ κενὸν φέρει τὸν 19
 καυλόν; ἢ ὢν ἀνάγκη ἄλλο φύειν;

Διὰ τί ἐν τῇ Ἀττικῇ οἱ μὲν ἄλλοι καρποὶ γλυκύ- 20
 τατοι γίνονται, τὸ δὲ θύμον δριμύτατον; καίτοι
 10 καὶ τοῦτο καρπός τις ἐστίν * * * ὥστε οὐ πολὺ
 ὑγρὸν τὰ φυόμενα ἔχει. ὅσα μὲν οὖν φύσει γλυκέα
 ἐστὶν διὰ μετριότητα τοῦ ἐνυπάρχοντος ὑγροῦ,
 ὅταν ἀπάγῃ ὁ ἥλιος τὸ πλεῖστον, τὸ ὑπολειπόμενον
 ῥαδίως πέττεται· τὸ γὰρ πολὺ ἔργον πεπάνθαι,
 τὸ δὲ μέτριον ῥᾶον. ὥστε γίνονται οἱ φύσει
 15 γλυκεῖς γλυκύτεροι. ἐν δὲ τοῖς φύσει ξηροῖς τε
 καὶ μὴ γλυκέσι καρποῖς λείπεται δι' ὀλιγότητα τὸ
 οἰκείον, τοῦτο δ' ἐστὶν ἡκιστα γλυκύ· ἀφαιρεῖται
 γὰρ ὁ ἥλιος τὸ γλυκύτερον καὶ κουφότατον· οὗτοι
 δὴ οὐκ ἔχουσι περιττὸν ὑγρὸν, ὥσπερ οἱ ἄλλοι
 καρποί.

Διὰ τί γλήχων καὶ τὰ λείρια καὶ τὰ κρόμμου τὰ 21
 20 κρεμάμενα ὑπὸ τὰς τροπὰς ἀνθεῖ; ἢ ἐνυπάρχει
 αὐτοῖς τροφή ἄπεπτος, ἢ¹ τοῦ μὲν χειμῶνος οὐ
 πέττεται διὰ τὸ ψῦχος, ὑπὸ δὲ τροπὰς πεττομένης
 διὰ τὴν ὥραν ἢ αὐξήσις γίνεται; αὕτη δὲ διὰ τὸ

¹ ἢ Forster : ἢ Ruelle.

^a These words are inserted from the Latin of Th. G.

reue need heat and warmth (this is why the plants benefit if one surrounds them with ashes), and the fig-tree is warm? This is proved by the fact that its sap is the bitterest of all, and gives out a quantity of smoke. So it contains heat and moisture in the same way as ashes do, so that if they benefit the plant it would necessarily grow best on the fig-tree; for the ash does not give off moisture but the fig-tree does so continually, since the moisture in the fig-tree never fails.

Why do some plants always produce an empty stalk? Are they among those which have to bear something else?

Why are all the other fruits in Attica very sweet, while thyme alone is very bitter? Yet thyme is a kind of fruit. (Is it because the soil is thin and dry,^a) so that the plants have not much moisture? Hence in those which are naturally sweet owing to the moderate amount of moisture in them, when the sun extracts most of it, the remainder is easily concocted; for it is difficult for a large quantity to ripen, but more easy for a moderate amount. So that plants which are naturally sweet grow sweeter. But in those fruits which are naturally dry and not sweet, the natural moisture fails because there is little of it, and it is not at all sweet; for the sun draws off the sweetest and lightest part; so these have not excessive moisture like other fruits.

Why do pennyroyal, lilies and onions flower when suspended at the summer solstice? Is there unconcocted nourishment in them, which is not concocted in the winter owing to the cold, but when it is absorbed under the influence of the summer solstice growth takes place because of the season? But this

925 a μὴ ἔχειν ἐπίρρυσιν ταχὺ μαραίνεται. οὐ γάρ τινα
 25 ἔχουσα ἀρχὴν οὐδέ τινα ἐπίρρυσιν ἀποξηραίνεται,
 ὥσπερ Σκύθαις διὰ τὸ πολλὴν τὴν χιόνα γίνεσθαι
 συμβαίνει τὸν σῖτον μένειν καὶ ταχὺ ἀνατρέχειν.

Διὰ τί τὸ κρόμμυον μόνον οὕτως περιπτῶς δάκνει 22
 τὸ ὄφθαλμῷ (διὸ καὶ τοῦνομά φασι τοῦτ' ἔχειν
 αὐτό, ὡς τὴν κόρην ποιεῖν συμμύειν), ἢ δὲ ὀρίγανος
 30 οὐ, οὐδ' ἄλλα δριμέα ὄντα; καὶ γὰρ τὸ ἀνάρρινον
 μᾶλλον δάκνον οὐ ποιεῖ ὁμοίως δακρύνειν προσ-
 φερόμενον, τὸ δὲ <κρόμμυον> προσφερόμενον καὶ
 τρωγόμενον. ἢ ὅτι διαφοραὶ πολλαὶ ἀκολουθοῦσιν
 ἐκάστοις τῶν δριμέων, ἃ ποιεῖ τὴν ἰδίαν ἐκάστου
 δύναμιν; τὸ μὲν οὖν ἀνάρρινον διὰ τὸ θερμότερον
 35 εἶναι ξηραντικώτερόν ἐστι τῆς γινομένης ὑπ' αὐτοῦ
 συντήξεως, ἐπεὶ ποιεῖ γε δάκρυον ἐσθίοντι· προσ-
 φερόμενον δὲ οὐ, ὅτι οὐκ ἀπατμίζει ἀπ' αὐτοῦ
 λεπτόν τι· ξηρότερον γὰρ ἐστι καὶ θερμότερον. ἢ
 925 b δὲ ὀρίγανος καὶ τὰ τοιαῦτα θερμὰ ξηρά ἐστιν
 ἡρέμα· δεῖ δὲ τὸ μέλλον δάκρυον ποιήσειν δηκτικὸν
 καὶ ὑγρὸν εἶναι καὶ γλίσχρον. διὸ καὶ τὸ ἔλαιον
 ποιεῖ δακρύνειν, ἀσθενῆ ἔχον δῆξιν· διὰ γλίσχρότητα
 5 γὰρ καὶ λεπτότητα παραδῦνον ποιεῖ τὸν πόνον, καὶ
 τὴν σύντηξιν διὰ τὸν πόνον. τὸ δὲ κρόμμυον
 τοιαύτην ἔχει τὴν δύναμιν ὥστε καὶ τὸ ὑγρὸν καὶ
 τὴν ἀτμίδα αὐτοῦ θερμὴν καὶ λεπτὴν καὶ γλίσχραν
 εἶναι. ὥστε προσφερόμενον μὲν, διὰ τὸ τὴν
 ἀτμίδα τοιαύτην εἶναι καὶ συναφιέναι ὑγρότητα
 10 λεπτήν, ποιεῖ δακρύνειν, ἐσθιομένου δὲ ἢ ἀνα-

growth is soon exhausted because there is no new influx of moisture. For if it has no source of supply and no influx it dries up, just as occurs among the Scythians, where owing to the quantity of snow the corn remains without growth and then suddenly springs up.

Why is it only the onion which makes the eyes smart so much (it is said that this is the reason of its name because it makes one close the eye over the pupil ^a), but marjoram does not, nor do any other pungent herbs? For instance, the nasturtium which is more biting does not cause tears to the same extent when applied to the eye, but the onion does so when applied to the eye or when eaten. Is it because each of the pungent herbs is followed by different results, which make the special quality of each? The nasturtium, for instance, because of its greater heat, prevails by its dryness over the melting which it produces, and so it causes tears when eaten, but not when applied to the eyes, because it produces no light vapour; the reason being that it is too dry and hot. But marjoram and similar hot herbs are only slightly dry. But to produce tears a plant must be pungent, wet and viscous. Hence the olive causes tears, although its pungency is slight; for it penetrates because of its viscosity and lightness and so causes pain, and, in consequence of the pain, melting. But the onion has this property, that its moisture and vapour are hot, light and viscous. So that when it is applied to the eyes, because its vapour has this character, and gives off a light moisture at the same time, it causes tears, and when it is eaten the evapora-

^a An entirely false derivation of κρόμμυον from κόρη, "a pupil," and μύειν, "to close the eyes."

925 b θυμιάσις διοῦσα * * * τὸ δὲ σκόροdon θερμὸν μὲν
καὶ δριμύ ἐστι καὶ ὑγρότητα ἔχει, ἀλλ' οὐ γλίσχρον·
διὸ οὐ ποιεῖ δακρύειν.

Διὰ τί τὰ μύρτα ἐν τῇ χειρὶ θλιβέντα γλυκύτερα 23
ἡμῖν δοκεῖ εἶναι τῶν μὴ τεθλιμμένων; ἢ καθάπερ
15 καὶ αἱ ῥᾶγες τετρυγημέναι τῶν βοτρύων γλυκύ-
τεραί εἰσιν ἢ τῶν ἀτρυγῆτων; ὑπὸ γὰρ τοῦ
γλεύκου ὄντος φύσει ἡδέος αἱ μὲν τετρυγημέναι
ῥᾶγες ὥσπερ εὐόκασιν ἡδυσμένοι (ἀνάπλεω γάρ
εἰσι καὶ ἔξωθεν), αἱ δ' ἐπὶ τῶν βοτρύων ἀνήδυστοι.
ὁμοίως οὖν καὶ ἐπὶ τῶν μύρτων φύσει γλυκέων
20 καὶ τὴν γλυκύτητα ἔχόντων ἐντός. ὥσπερ αἱ
ῥᾶγες οὖν, ὅταν θλιφθῆ, ἀναπίμπλαται ἀπὸ τῆς
ἐντός γλυκύτητος καὶ ἔξωθεν διαφαίνεται γλυκύ-
τερα ὄντα.

Διὰ τί τῶν τε μύρτων τὰ ἐλάττω ἀπυρηνότερά 24
ἐστι, καὶ ἐν τοῖς φοίνιξι καὶ ἐπὶ τῶν βοτρύων, ἔνθα
25 δ' αἱ μικραὶ ῥᾶγες οὐκ ἔχουσιν ἢ ἐλάττους πυρῆνας;
ἢ διὰ τὸ ἀτελέστερα εἶναι οὐκ ἔχει ἀποκεκριμένον;
τέλος γὰρ ὁ πυρῆν ἔχει τὸ σπέρμα. διὰ τοῦτο δὲ
καὶ ἐλάττους εἰσίν, ὡς ὄντα παραφυάδες καὶ
ἀτελεῆ. καὶ ἦττον δὲ γλυκέα τῶν ἔχόντων πυρῆνας·
ἀπεπτότερα γὰρ ἐστίν, ἢ δὲ πέψις τελείωσις ἐστίν.

30 Διὰ τί τῶν περικαρπίων τὰ μὲν πικρότερα τὰ 25
πρὸς τὴν ῥίζαν ἔχει, οἷον σίκυοι, τὰ δὲ πρὸς τὸ
ἄκρον τὸ ἄνω, οἷον αἱ βάλανοι; ἢ ὅτι τῶν μὲν
ταύτη ἀπεπτος ἢ τροφή διὰ τὸ ἐπιρρεῖν κατὰ τὴν
ῥίζαν αἰεὶ· τὰ δὲ ξηρὰ φύσει ἐστίν, ὥστε ἀπ-
αγομένου τοῦ γλυκέος ἐκ τοῦ ἄκρου καὶ πεπεμ-
35 μένου ἤδη ξηραίνεται, καὶ λείπεται τὸ πικρὸν

^a The lacuna in the ms. may be supplied by the words in parenthesis, taken from Th. G.

PROBLEMS, XX. 22-25

tion penetrates (and produces the same effect).^a The leek, however, is hot and pungent and contains moisture, but is not viscous ; hence it does not cause tears.

Why do myrtle-berries seem to be sweeter when 23 crushed in the hand than when they are not so crushed ? Is it for the same reason that grapes which have been gathered are sweeter than those which have not been gathered ? For gathered grapes seem to be sweetened by the sweetness which is naturally theirs (for they are full of it even on the surface), whereas those which are still in clusters are not so sweetened. So the same thing is true of myrtle-berries, which are naturally sweet and have sweetness within them. So, just like the grapes when they are pressed, myrtle-berries are saturated by the internal sweetness and are obviously sweeter externally.

Why do smaller myrtle-berries tend to be stone- 24 less ? The same thing is true of dates and grape clusters, in which the small grapes either have no stones or only small ones. Is it because being imperfect they have no differentiated part ? For the purpose of the stone is to contain the seed. The reason why they are smaller is that they are outgrowths and imperfect. And they are less sweet than those which contain stones ; for they are less ripe, and the ripening is their perfection.

Why is it that some seed-pods are more bitter to- 25 wards the root of the plant (as in gourds), but others towards the upper parts (as in acorns) ? Is it because in the former the food is unconcocted, because it is always flowing along the root ? But the latter are naturally dry, so, as the sweetness is gradually drawn from the top and concocted, this part dries, and the

925 b ὥσπερ οἱ ἄλεις; ξηραίνόμενον δὲ μᾶλλον πικρὸν γίνεται, καθάπερ ἔλαιαι καὶ βάλανοι παλαιούμεναι πικραὶ γίνονται.

926 a Διὰ τί ἔνια βλαστάνει οὐκ ἐν τῇ γῆ ὄντα, ἀλλ' 26 ἐκτετμημένα, τὰ δὲ κείμενα, οἷον οἱ τῶν κρίνων καυλοὶ καὶ σκόροδα καὶ κρόμμυα; ἢ ὅτι ἔχουσι τροφήν ἅπαντα ἐν αὐτοῖς, ἀλλ' οὐκ ἐν ἀφωρισμένῳ 5 τόπῳ (οὐθὲν φυτόν¹); [ἢ περιουσία οὖν ἐστὶ τῆς τροφῆς ἢ ποιούσα βλαστάνειν. δῆλον δέ· καὶ γὰρ καὶ αἱ σκίλλαι καὶ οἱ βολβοὶ ταῦτὸ ποιούσιν.] αὖξεται δ' ἕκαστον οὐ τῷ ἔχειν, ἀλλ' ὅταν πεφθῆ 10 καὶ διανεμηθῆ. ἔχει μὲν οὖν καὶ ἔμπροσθεν, αὖξεται δέ, ὅταν ἡ ὥρα ἔλθῃ ἐν ἣ τούτο γίνεται πεττούσης ὥρας, οἷον καὶ τὰ τῶν κροκοδείλων ὥα. 15 συνεχές δὲ οὐκέτι, ὅτι οὐκ ἐπιρρεῖ ἄλλη τροφή.

Διὰ τί ποτε τὰ σκόροδα καὶ τὰ κρόμμυα ὄσω 27 ἂν ξηρότερα φυτεύηται, τοσοῦτῳ βελτίῳ γίνεται, τὰ δὲ ἄλλα χείρω; ἢ ὅτι πάντα τὰ τοιαῦτα μάλιστα ὑγρασίας ἐστὶ πλήρη; εὐκράτα οὖν γίνε- 15 ται τούτον τὸν τρόπον φυτευθέντα. καὶ ὅτι ἦττον σήπεται, ὅταν ξηρανθέντα φυτευθῆ.

Διὰ τί ποτε τὰ σκόροδα καὶ τὰ κρόμμυα μόνα 28 τῶν φυτῶν κείμενα βλαστάνει; ἢ διότι ὑγρασίας ἐστὶ πλήρη καὶ τροφῆς; ἢ περιουσία οὖν ἐστὶ τῆς τροφῆς ἢ ποιούσα βλαστάνειν. δῆλον δέ· καὶ γὰρ 20 αἱ σκίλλαι καὶ οἱ βολβοὶ ταῦτὸ ποιούσιν. αὖξεται δέ, ὅταν ἡ ὥρα ἔλθῃ ἕκαστῳ.

Διὰ τί τὰ τῷ ψυχρῷ ὕδατι ἀρδόμενα γλυκύτερα 29 ἢ τὰ τῷ θερμῷ; πότερον ὅτι ἐγκατακλειόμενον τὸ θερμὸν ἀλμυρώτερον, ὥσπερ καὶ τὸ ἀλμυρώτερον θερμότερον, τὸ δὲ γλυκὺ ἐναντίον, ὥσπερ ψυχρόν.

¹ These words are omitted as untranslatable.

PROBLEMS, XX. 25-29

bitter part remains behind like salt. As it dries it grows more bitter, just as olives and acorns become bitter as they grow old.

Why do some plants grow when they are not in 26 the ground but are cut off, and others when placed in store, like the stalks of lilies, leeks and onions? Is it because they all contain nourishment within themselves, and not in some separate place? Hence it is their surplus nourishment which makes them grow. This is evident; for squills and bulbs do the same thing. Each of them grows, not merely because it contains nourishment, but when that nourishment is concocted and distributed. It therefore contains the nourishment beforehand, but it grows when the season arrives in which the effect is produced by the season causing the concoction, as also occurs with crocodile's eggs. The process is not continuous, because no fresh nourishment flows in.

Why do garlic and onions become better, the drier 27 they are when planted, whereas other herbs deteriorate? Is it because all such plants are particularly full of moisture? So when planted in this way they enjoy more equable conditions. It is also because they are less inclined to rot when they are planted dry.

Why are garlic and onions the only plants which 28 will grow when laid aside? Is it because they are full of moisture and food? So it is their surplus food which makes them grow. This is clear; for squills and bulbs behave in the same way. And they grow when the season for each arrives.

Why are plants watered with cold water sweeter 29 than those watered with hot? Is it because the heat enclosed is more salt, just as the saltier is hotter, but the sweet is just the opposite, as it were cold?

926 a
25 τροφή δὲ τοῖς λαχάνοις τὸ ὑγρὸν, καὶ οἱ χυμοὶ
ἐντεῦθεν.

Διὰ τί τὰ σκόροδα ὄζει μᾶλλον ἐγκαυλοῦντα ἢ 30
νέα ὄντα; ἢ ὅτι νέων μὲν ὄντων ἔτι πολὺ ὑγρὸν
ἀλλότριον ἐνὸν ἀφαιρεῖται τὴν δύναμιν αὐτῶν;
ὅταν δὲ πεπανθῇ, ἐκκεκριμένου ἤδη τούτου, τότε
80 τὴν οἰκείαν ἔχει ὁσμὴν. αὕτη δὲ ἐστὶ φύσει
δριμεία. ὁμοίως δὲ καὶ οἱ ἄλλοι καρποὶ οἱ πρόσ-
φατοι ὄντες ὑδαρέστεροι. διὸ καὶ τὰ κρόμμυα
ἤττον δριμεία τὰ νεώτερα.

Διὰ τί τῶν μυρρινῶν μὲν μὴ τεταριχευμένων τὰ 31
μύρτα ἀπορρεῖ μᾶλλον τῶν φύλλων, ταριχευομένων
85 δὲ τῷ φύκει τὰ μὲν φύλλα ἀπορρεῖ, τὰ δὲ μύρτα
οὐκ ἀπορρεῖ; ἢ ἀταριχεύτων μὲν ὄντων οὕτως
ἔχει διὰ τὴν φύσιν; ὅταν γὰρ πεπανθῇ, ἀπορρεῖν
πέφυκεν τὰ μύρτα. τοῦτο δὲ οὐ συμβαίνει κει-
μένων, ἀλλὰ μόνον κωλύει ἢ ἰκμᾶς τοῦ φύκος
μεταβάλλειν τὸ ἐν τῷ μύρτῳ ὑγρὸν. τὰ δὲ φύλλα
926 b ἀποπίπτει τούναντίον αὐτῶν ξηρανομένων, τὸ δὲ
φῦκος ξηραίνει ἀλμυρὸν ὄν. οὐ ταῦτὸ οὖν συμ-
βαίνει ἐπὶ τε τῆς μυρρίνης οὔσι καὶ κειμένοις τοῖς
φύλλοις.

Διὰ τί οἱ σίκυοι (οἶ) πέπονες ἄριστοι γίνονται ἐν 32
5 τοῖς ἐλώδεσι πεδίοις οὔσιν ἐνύγροις, οἷον περὶ Ὀρ-
χομενὸν καὶ ἐν Αἰγύπτῳ; δοκεῖ δ' ἐνυδρος αὕτη ἢ
χώρα εἶναι. ἔστι δὲ τὰ ἐλώδη ἐνυδρα· οἱ δὲ σίκυες
αὐτοὶ ὑγρότεροι· διὸ καὶ οἱ κηπαῖοι φαῦλοι εἰσίν.
πότερον ὅτι εἰς βάθος διὰ σκληρότητα τῆς γῆς
ἀναγκάζονται φυτεύεσθαι; ἢ γὰρ πηλώδης καὶ
10 πεδιάς μάλιστα γίνεται σκληρά, οἱ δὲ εἰς βάθος
φυτευθέντες βελτίους. ἢ διότι ξηρὰν δεῖ εἶναι τὴν
γῆν διὰ τὸ αὐτὸ εἶναι ὑγρὸν φύσει; οὕτω γὰρ

PROBLEMS, XX. 29-32

The food of vegetables is, of course, liquid and hence their juices.

Why has garlic a more powerful smell when it has 30 run to stalk than when it is young? Is it because, when it is young, there is a quantity of foreign moisture in it which robs its strength? But when it has ripened, this moisture has been forced out, and it then has its proper smell. This is naturally pungent. In the same way the other fruits when they are young are more watery. This is why young onions are less pungent.

Why is it that, when myrtle-branches are not em- 31 balmed, the berries fall off more than the leaves, but when they are preserved in seaweed, the leaves fall off, but the berries do not? Is not this quite in accordance with nature, when they are not preserved? For when they grow ripe, it is natural for the berries to fall off. But this does not happen when they are stored away, but the moisture in the seaweed only prevents a change in the liquid of the berry. The leaves on the other hand fall off when the branches get dry, and seaweed being salt dries them. So the same thing does not happen to myrtle-leaves when they remain on the trees and when they are stored.

Why do melons ripen best in marshy plains, which 32 are damp, as for instance about Orchomenos and in Egypt? For this country seems to be wet. Now marshy ground is wet and gourds are themselves wet; and this is why the garden variety is poor. Is it because owing to the hardness of the ground they must be planted deep? For clayey flat ground becomes very hard, and those which are planted deep are better. Or is it because the ground should be dry because the plant is naturally moist? For by

926 b ἀντισπώμενον ἐπὶ τὸ μέσον ἤξει. ἢ δὲ ἐλω-
 δεστέρα μὲν, βαθεῖα δὲ τροφήν ἴσχει καὶ διὰ τὸ
 βάθος τῆς γῆς καὶ διὰ τὸν τόπον, καὶ οὐχ ὑπερ-
 15 βάλλουσαν διὰ τὸ ξηραίνεσθαι τὴν γῆν πάλιν.

Διὰ τί τὸ πήγανον δυσώδεις τοὺς ἰδρῶτας ποιεῖ, 33
 καὶ ἔνια τῶν μύρων; ἢ ὅτι ὄσων ἐν τῇ ὀσμῇ
 βαρύτης ἐνὶ καὶ δριμύτης, ταῦτα κεραυνύμενα ταῖς
 περιπτωματικαῖς ὑγρότησι κακωδεστέραν ποιεῖ τὴν
 ὀσμήν;

20 Διὰ τί τὸ πήγανον βασκανίας φασὶ φάρμακον 34
 εἶναι; ἢ διότι βασκαίνεσθαι δοκοῦσι λάβρως
 ἐσθίοντες; ἢ ὑφορώμενοί τινος δυσχερείας καὶ
 περὶ τὰ προσφερόμενα ὑπόπτως ἔχοντες; ἐπι-
 λέγουσι γοῦν, ὅταν τῆς αὐτῆς τραπέζης ἰδία τι
 προσφέρωνται, μεταδιδόντες, “ἵνα μὴ βασκάνης
 25 με.” ἅπαντες οὖν μετὰ ταραχῆς τῶν βρωμάτων
 προσοίονται τὸ διδόμενον ὑγρὸν ἢ σιτίον, ὑφ’ ὧν
 ἢ καταλαμβανομένων ἢ ἀπεμουμένων μετεωρι-
 σθέντα τὰ σιτία συνεξέπεσεν καὶ τὰ πνεύματα ὑπὸ
 τῶν ὑγρῶν καὶ πόνους καὶ στρόφους παρέχει. τὸ
 πήγανον οὖν προεδεσθὲν, θερμαντικὸν ὄν τῇ φύσει,
 30 ἠραίωσε τὸ δεχόμενον ἀγγεῖον τὰ σιτία καὶ τὸ
 ἄλλο σῶμα. διὸ ἐξίεσθαι τὸ ἐγκαταλαμβανόμενον
 πνεῦμα συμβαίνει.

Διὰ τί ἢ ὀρίγανος ἐμβαλλομένη τῷ γλεύκει 35
 γλυκὺν ποιεῖ τὸν οἶνον; ἐμβάλλονται δὲ δύο
 κοτύλαι εἰς τὸν ἀμφορέα. ἢ ὅτι ἐξαίρει δι’ ὧν ἢ
 35 αὐστηρότης γίνεται, τὸ ὑδατῶδες καὶ τὸ τρυγῶδες
 ἀναδεχομένη τῇ ξηρότητι εἰς ἑαυτήν; σημεῖον δὲ
 ὅτι ἐκ τούτων τὸ αὐστηρόν· οἱ γὰρ οἶνοι ἤττον
 μαλακοί, ἐὰν ὕδωρ παραχεθῆ, καὶ ἐὰν ἐν τῇ τρυγῇ
 πλείω χρόνον ἐάσῃ τις. καὶ ὅταν ποιῶσι γλυκὺ,
 438

PROBLEMS, XX. 32-35

the two counteracting tendencies it will reach the mean state. For ground which is rather marshy but deep holds the food both because of the depth of soil and because of the locality ; but not in excess, because the soil dries again.

Why do rue and some other spices give the sweat 33 an unpleasant smell? Is it because those herbs whose scent is heavy and pungent, when mixed with the moist waste products produce a still more unpleasant smell?

Why is rue supposed to be a cure for the evil eye? 34 Is it because men expect the evil eye when they have eaten greedily? Or when they are anticipating unpleasantness and are suspiciously inclined to what is brought to them? For instance, when they take anything from the same table for themselves they offer a share to another with the words "to prevent you from casting the evil eye on me." So all men will swallow with misgivings the food offered them, whether liquid or solid, the constriction or vomiting of which causes the solids to rise and be ejected, and the flatulence from the liquids causes pain and writhing. So rue when eaten beforehand, being naturally hot, rarefies the receptacle of food, and all the rest of the body. So the flatulence which is enclosed within passes outside.

Why does marjoram, put into must, make the wine 35 sweet? For a pint is put into a wine jar. Is it because it removes the cause of harshness, because owing to its dryness it absorbs the moisture and the lees of the wine? There is evidence that the harshness of wine is due to these causes; for wines are less soft if water is poured on them, and if one leaves them for a long time on the lees. When they make

^{926 b} ἡλιῶσι τὰς σταφυλὰς πολὺν χρόνον, καὶ ὁ ἥλιος
^{927 a} ἀφαιρεῖ τὸ ὕδατῶδες καὶ τὸ λοιπὸν συμπέττει.
 ταῦτό δὲ τοῦτο ποιεῖ καὶ ἡ ὀρίγανος· ξηρὰ γὰρ καὶ
 θερμή, ὥστε εἰκότως διαμένει.

Διὰ τί αἱ μέλαιναί μυρρίναι πυκνοφυλλότεροί εἰσι ³⁶
 τῶν λευκῶν μυρρινῶν; ἢ ὅτι ἀγριώτεραι τὸ γένος;
^b σημεῖον δὲ ὅτι γίνονται ἐν τοῖς ἀγροῖς καὶ ἤκιστα
 μεταβάλλουσιν ὑπὸ τῆς ἐπιμελείας. τὰ δὲ ἄγρια
 πάντα πυκνοφυλλότερα· διὰ γὰρ τὸ ἥττον πέττειν
 τὸν καρπὸν εἰς τὰ φύλλα ἢ τροφήν τρέπεται.

PROBLEMS, XX. 35-36

sweet wine they expose the grapes to the sun for a long time, and the sun draws out the watery part and concocts the residue. Now marjoram has just the same effect ; for it is dry and hot, so it naturally produces a permanent result.

Why do dark myrtle-trees have thicker foliage 36 than light ones ? Is it because they are a wilder kind ? There is evidence for this in the fact that they grow in the fields, and change very little under cultivation. But all wild plants have thicker foliage ; for because the fruit is less concocted, the food is diverted into the leaves.

ΚΑ

927 a
10

ΟΣΑ ΠΕΡΙ ΑΛΦΙΤΑ ΚΑΙ ΜΑΖΑΝ ΚΑΙ ΤΑ ΟΜΟΙΑ

Διὰ τί ἡ πτισάνη καὶ τὸ ἄλευρον ἐλαίου ἐπι-
 χρομένου λευκότερα γίνεται; καίτοι τὸ ἔλαιον
 πυρρόν. ἢ ὅτι πέφυκεν μιννύμενον τῷ ὑγρῷ
 ἀφρίζειν; τοῦτο δὲ ἡ λευκότης. ἢ δὲ μίξις τρίψει
 15 καὶ κινήσει. μίννυται δὲ μᾶλλον τοῖς σωματικοῖς.
 ἐν δὲ τοῖς ἐψήμασι τοῦτο συμβαίνει, διὸ καὶ λευκό-
 τερα ποιεῖ.

Διὰ τί ἡ ἐκ τοῦ πυροῦ τροφή μάλιστα ἀρμόττει 2
 τοῖς σώμασιν καὶ μᾶλλον τρόφιμος ἢ ἡ ἐκ τῶν
 κριθῶν; ἢ διότι μετρίαν ἔχει γλισχρότητα; δεῖ
 20 δὲ τὴν τροφήν ἔχειν τοῦτο· προσφῦναι γὰρ δεῖ καὶ
 προσκολληθῆναι τῷ σώματι· οὐ αἴτιον τὸ γλίσχρον.
 ἀλλὰ <ἡ κριθή>¹ ψαθυρώτερον· διὸ αἱ τετριμμένα
 σφόδρα μᾶζαι τροφιμώτεραι τῶν ἀτρίπτων.

Διὰ τί τῶν μὲν ἀλεύρων τὰ πρῶτα, τῶν δὲ 3
 ἀλφίτων τὰ τελευταῖα λαμπρότερα; ἢ διότι τὸ
 25 μὲν καπυρὸν ὄν περιθραύεται, τὸ δὲ μαλακὸν
 ἐνθλίβεται; λαμπρότατον δὲ ἐν ἀμφοτέροις τὸ
 ἐντός.

Διὰ τί οἱ ἄρτοι λευκότεροι φαίνονται ψυχροὶ ὄντες 4
 ἢ θερμοί; ἢ διὰ τὴν αὐτὴν αἰτίαν τρόπον τινὰ καὶ
 τὸ ἔλαιον λευκότερον τοῦ προσφάτου τὸ παλαιόν;

¹ <ἡ κριθή> added by Forster from Th. G.

BOOK XXI

CONCERNING BARLEY-MEAL AND THE LIKE

WHY do barley-meal and wheat flour grow lighter 1 in colour when oil is poured on them? Yet oil is reddish in colour. Is it because when mixed with liquid it naturally bubbles? And this produces a light colour. But mixture is effected by rubbing and stirring, and mixture takes place more in solid particles. But this effect occurs in boiled liquids, and this is what makes it whiter.

Why is food made from wheat best suited to the 2 body and more nutritive than food made from barley? Is it because it has a moderately glutinous character? And food should have such a character; for it must grow into and adhere to the body; and glutinousness is the cause of this. Now barley is very friable; this is why cakes of well-kneaded barley are more nutritive than those of unkneaded barley.

Why is the first grinding of wheat and the last of 3 barley the lightest? Is it because the wheat being dry breaks up, but the barley being soft is crushed? And in both the interior is lightest.

Why do loaves of bread seem to be whiter when 4 they are cold than when they are hot? Is it in some sense in the same way that old oil is whiter than new?

927^a
30 αἴτιον γὰρ τῆς μελανίας τὸ ὕδωρ, τοῦτο δὲ ἐν
ἀμφοτέροις πλείον προσφάτοις οὖσιν· χρονιζο-
μένοις δὲ διὰ τὸ ἐξατμίζειν λείπεται ἕλαττον τὸ
ἐπιπολῆς. ἐξατμίζει δὲ τοῦ μὲν ἐλαίου ἢ ὁ χρόνος
ἢ ὁ ἥλιος· ἐκ δὲ τῶν ἄρτων ψυχομένων τὸ θερμὸν
ἐξιὸν ψυχρῶν μὲν ὄντων ἐξελήλυθεν, ἐν δὲ θερμοῖς
οὖσιν ἔτι ἔνεστιν.

35 Διὰ τί οἱ ἀναλοι ἄρτοι πλείονα σταθμὸν ἔχουσιν 5
τῶν ἠλισμένων, τῶν ἄλλων αὐτοῖς ἴσων ὑπ-
αρχόντων; εἰκὸς δὲ ἦν τοῦναντίον· οἱ γὰρ ἄλες
πρόσκεινται τε καὶ βαρύτεροι τοῦ ὕδατός εἰσιν. ἢ
ὅτι ξηραίνουσιν οἱ ἄλες; διὸ καὶ σώζεται ἄσηπτα
τὰ ταριχευόμενα· ἀναλίσκεται γὰρ καὶ ἀνα-
927^b ξηραίνεται τὸ ὑγρὸν ὑπ' αὐτῶν, ὃ σήπεται ὑπὸ
τοῦ θερμοῦ. καὶ ἐν τῷ ἄρτῳ οὖν ἀναλίσκεται τὸ
ὑγρὸν ὑπὸ τοῦ ἁλός, καὶ ἀποπνεῖ ἔξω. διὸ καὶ οἱ
ἔωλοι ἄρτοι κουφότεροί εἰσι τῶν θερμῶν, ψυχρό-
5 τεροι ὄντες. ἐν δὲ τοῖς μὴ ἠλισμένοις τοῦτο τὸ
ὑγρὸν πλείον ἐνυπάρχον ποιεῖ βαρυτέρους αὐτούς.

Διὰ τί οἱ μὲν ψυχροὶ ἄρτοι ἀναβρεχθέντες, εἰ 6
ἄψονται ἀλλήλων, οὐ συνέχονται, οἱ δὲ θερμοί; ἢ
ὅτι οἱ μὲν ψυχροὶ μετὰ τῆς ἀτμίδος ἀφιασι τὸ ἐν
αὐτοῖς γλίσχρον ὑγρὸν, οὐ ἐξελθόντος οὐ κολλῶνται
10 (τὸ γὰρ ὕδωρ ὧ ἐβρέχθησαν ψαθυρώτερόν ἐστιν),
οἱ δὲ θερμοὶ ἔχουσί τινα γλισχρότητα; ὅταν μὲν
οὖν βεβρεγμένων αὐτῶν ἢ ἀτμῖς ἐξίη, τὸ μὲν
θερμὸν διαπνεῖ διὰ λεπτότητα, τὸ δὲ κολλῶδες
συνεξιὸν αὐτῷ καὶ μιγνύμενον τῷ ὑγρῷ προσ-
έχεσθαι ποιεῖ ἑαυτοῖς.¹

15 Διὰ τί τῶν ἀλεύρων τὰ πρῶτα² λαμπρότατά ἐστιν, 7

¹ προσέχεσθαι . . . ἑαυτοῖς Bussemaker: προσέρχεσθαι . . .
αὐτοῖς Ruelle.

PROBLEMS, XXI. 4-7

For water is the cause of its dark colour, and more of this is present in both when they are new. But after a long time less is left on the surface owing to evaporation. In the case of oil either time or the sun is the cause of evaporation, but with loaves as they cool the heat escapes and when they are cold it has gone, but while they are hot it is still there.

Why have unsalted loaves more weight than 5 salted, supposing that the other contents are the same? It would seem natural that just the opposite should happen; for salt adds to the weight and is heavier than water. Is it because salt is a drying agent? This is why pickled goods do not decay. For the moisture (which decays under the influence of heat) is exhausted and dried by it. So in the loaf the moisture is exhausted by the salt, and evaporates to the outside. This is why stale loaves are lighter than hot ones, because they are colder. But in unsalted loaves this moisture being greater makes them heavier.

Why is it that when cold loaves are wetted and 6 placed touching each other they do not stick together, whereas hot ones do? Is it because cold loaves give off the wet viscosity which is in them together with the evaporation, and when this is gone they do not adhere (for the water with which they were wetted is less cohesive), but hot loaves still contain viscosity? When, then, evaporation comes off from them when wet, the heat evaporates owing to its lightness, but the sticky part comes off with it, and being mixed with the moisture causes them to stick together.

Why is the first part of ground wheat and the last 7

² *ἄλφιτα* ms., but this is evidently a repetition of Problem 3. Th. G. confirms the alteration.

927^b τῶν δὲ ἀλφίτων τὰ τελευταῖα; ἢ ὅτι τὸ μὲν
 ἄλφιτον καπυρὸν ὄν περιθραύεται, οἷον μάλιστα
 πάσχει πλείστοι χρόνοι κοπτόμενον, τὸ δὲ μαλακὸν
 καὶ λεπτοὶ ἄλευροι, ὃ ἐστὶν ἐντὸς τοῦ πυροῦ,
 20 ἐκθλίβεται πρῶτον. λαμπρότατον δέ ἐστὶν ἐν
 ἀμφοτέροις τὸ ἐντὸς.

Διὰ τί ἢ μὲν μᾶζα ὄσω ἂν μᾶλλον τριφθῆ, δυσ- 8
 διαχωρητοτέρα γίνεται, ὃ δὲ ἄρτος εὐδιαχωρητό-
 τερος; ἢ διὰ τὸ τριφθῆναι σφόδρα τὸ σταῖς
 μικρότερον γίνεται; τὸ γὰρ γλίσχρον τοιοῦτόν
 25 ἐστὶν, ὑπὸ δὲ τοῦ πυρὸς πάντοθεν ἐξήρηται τὸ
 ὑγρὸν τοῦ ἄρτου, ὥστε ψαθυρότερον γίνεται τοῦ
 ὑγροῦ ἐξαιρεθέντος ὅλως, ὄσω ἂν μᾶλλον τριφθῆ,
 διὰ τὸ ἐν τῇ τρίψει μικρομερέστερον γεγονέναι·
 τὸ δὲ ψαθυρὸν εὐπεπτότερόν ἐστιν. ἢ δὲ μᾶζα
 ὄσω ἂν μᾶλλον τριφθῆ, γλισχροτέρα γίνεται τοῦ
 30 ὑγροῦ μεμιγμένου· τὸ δὲ γλίσχρον οὐκ εὐδιαίρετον.
 τὰ δὲ τοιαῦτα δύσπεπτά ἐστιν· δεῖ γὰρ τὸ πεφθησό-
 μενον διαιρεθῆναι εἰς μικρά.

Διὰ τί ἢ μὲν μᾶζα τριβομένη ἐλάττων γίνεται, 9
 τὸ δὲ σταῖς μεῖζον; ἢ ὅτι τὸ μὲν ἄλφιτον βρεχθὲν
 καὶ τριβόμενον συνίξει τῇ τοῦ ὑγροῦ κολλήσει διὰ
 35 τὸ ἀραιὸν εἶναι καὶ χονδρόν, τὸ δὲ ἄλευρον μετεωρί-
 ζεται διὰ τὸ πυκνὸν σφόδρα εἶναι; τὰ γὰρ πυκνὰ
 τριβόμενα θερμαίνεται, θερμαινόμενα δὲ καὶ πνευ-
 ματούμενα μετεωρίζεται, καθάπερ καὶ ἡ σὰρξ.

Διὰ τί δὲ πυρούμενον τὸ σταῖς μεῖζον γίνεται ἢ 10
 928^a ἢ μᾶζα; ἢ ὅτι ἔχει ὑγρὸν οὐ κεχωρισμένον, ὥστε
 ἐξιέναι θερμαινόμενον διὰ τὴν τρίψιν; ἐξ οὗ θερ-
 μαινομένου πνεῦμα γίνεται, ἐκ δὲ τοῦ πλείονος
 ὑγροῦ ἀνάγκη γίνεσθαι πλείον πνεῦμα.

5 Διὰ τί τοῦ μέλιτος κολλητικωτέρου ὄντος ἢ τοῦ 11

part of ground barley the lightest in colour? Is it because the barley being dry breaks up, which happens especially when it is ground for a very long time, but the flour within the wheat being soft and fine is crushed out first? In both cases the part inside is the lightest.

Why is it that barley-cake, the more it is kneaded, 8 becomes more indigestible, but bread less so? Is it because by the kneading the dough becomes less? Now the glutinous part is of this kind, but the whole moisture of the loaf is withdrawn from all parts by the fire, so that when the moisture is entirely withdrawn it becomes drier, the more it is kneaded, because by the kneading it is broken into smaller particles; but what is dry is more digestible. But barley-cake the more it is kneaded becomes more glutinous because of the water mixed with it; and what is viscous is not easily divisible. Such things are indigestible, for what is to be digested must be divided up into small particles.

Why does barley-cake when kneaded become less 9 bulky, but dough more so? Is it because barley when wetted and kneaded is bound by the adhesiveness of the liquid, being fine and gritty, but wheat flour rises because it is very thick? For thick bodies when kneaded grow hot, and when they grow hot and aerated they rise just as the flesh does.

Why does heated dough increase in bulk more than 10 heated barley-cake? Is it because dough contains moisture which is not separated, so that it escapes when heated owing to kneading? When it is heated air is given off from it, and from a larger quantity of liquid evidently more air must come.

Why is it that, though honey is more adhesive than 11

928^a ὕδατος, τὸ τῷ μελικράτῳ φυραθὲν ἄλευρον ψαθυρώ-
 τερον γίνεται, ὅταν ἐψηθῇ ἢ ὀπτηθῇ, ἢ τὸ τῷ
 ὕδατι; ἢ διότι τὸ μὲν ὑπὸ τοῦ πυρὸς πήγνυται
 καὶ συνίσταται, [τὸ ὕδωρ,] τὸ δὲ μέλι συνιστᾷ μὲν,
 10 ἀλλ' ἐπιξηραίνει διὸ μᾶλλον ψαθυρὸν ποιεῖ· ἢ γὰρ
 ψαθυρότης ὑπὸ ξηρασίας γίνεται.

Διὰ τί οἱ δίπυροι ἄρτοι ψυχθέντες οὐ γίνονται 12
 σκληροί; ἢ ὅτι ἔχει τινὰ ἐν αὐτῷ ὁ πυρὸς γλυκὺν
 καὶ γλίσχρον χυμόν, ὅς ἐστιν αὐτοῦ καθάπερ
 ψυχή; σημεῖον δέ· ξηραίνόμενος μὲν γὰρ ὅλως
 15 κενούται, νοτιῶν δὲ ἐκφύεται. τοῦ οὖν χυμοῦ
 τούτου ἐνυπάρχοντος καὶ ἐν τῷ ἀλεύρῳ καὶ μάλιστα
 τῷ καθαρωτάτῳ, σταιτὸς γενομένου τοῦ ἀλεύρου
 καὶ τριβομένου συμβαίνει αὐτό. σημεῖον δέ· ἐψό-
 μενον γὰρ διαχωρητικώτερον γίνεται. ὀπτωμένου
 μὲν οὖν τὸ πρῶτον τοῦ ἄρτου, τὸ ψαθυρὸν καὶ
 20 ἐλαφρὸν τοῦ δὲ ὑγροῦ τοῦ ἐκ τοῦ ἄρτου ἀπατμίζει,
 καὶ τοῦ ἀλεύρου τὸ ἀχυρωδέστατον ἀποκαίεται.
 ἐξαιρεθέντος δὲ καὶ τριβομένου πάλιν τοῦ σταιτός,
 τό τε τοῦ ἀλεύρου λειότατον καὶ τοῦ ὑγροῦ γλισχρο-
 τατον λειπόμενα μίγνυται μᾶλλον ἑαυτοῖς, διὰ τε
 τὸ τοιαῦτα καὶ μᾶλλον γεγονέναι, καὶ διὰ τὴν
 25 πύρωσιν· βαφῆ γὰρ ἢ μίξις αὐτῶν ὁμοία γίνεται,
 ὥστε γίνεσθαι τὸ ὕστερον τριφθὲν σταῖς ὅμοιον τῷ
 ἐψομένῳ ἀλεύρῳ. καὶ γὰρ ἐκεῖνο, τριφθέντος τοῦ
 σταιτός καὶ λειφθέντος τοῦ λεπτοτάτου ἀλεύρου
 καὶ τοῦ γλισχροτάτου ὑγροῦ, πυρωθὲν κολλῶδες
 γίνεται καὶ ἀνεξίκμαστον· τό τε γὰρ γλίσχρον
 30 δυσδιαίρετον, καὶ τὸ πυκνὸν οὐθὲν δι' αὐτοῦ
 προῖεται ὑγρόν. τοῦτο οὖν καὶ διάπυρος¹ πάσχει

¹ Text Forster: προῖεται. ὑγρότατον οὖν τοῦτο καὶ διὰ πυρὸς Kuelle.

water, yet wheaten flour, whether boiled or baked, is more friable when mixed with honey-water than with plain water? Is it because one element, the water, is set and amalgamated by fire, but honey, though it sets, also causes dryness, and so it makes it more friable? Friability is caused by dryness.

Why do loaves which have been twice baked not 12 grow hard when they are cold? Is it because wheat contains a juice which is sweet and viscous, which is so to speak its "soul"? There is evidence for this; for when it grows dry the grain is completely empty, but when wetted it fills out again. Now as this juice also exists in wheaten flour, especially in the purest kind, when the flour becomes dough and is kneaded this very thing happens. There is evidence for this; for when boiled it is more digestible. When, then, the loaf is baked for the first time, the light part which coheres loosely evaporates from the moisture in the loaf, and the part like chaff is burned out from the flour. But when the dough is removed and kneaded again, the smoothest part of the flour and the most viscous part of the moisture which are left behind mix more intimately with each other, both because these qualities are more marked and because of the heat; for the effect of the mixture is similar to dyeing, so that the dough when kneaded a second time becomes like flour which is boiled. For in the latter case, when the dough is kneaded and the lightest part of the flour and the most viscous part of the moisture are left behind, the mixture when heated becomes sticky and does not dry; for the viscous is not easily divided, and that which is dense does not readily let moisture pass through it. The twice baked loaf also undergoes this process owing

ἄρτος διὰ τὰ εἰρημένα· ἔχων δὲ αἰεὶ ὑγρότητα οὐ γίνεται σκληρός.

Διὰ τί τῆς τροφῆς καὶ τῆς ξηρᾶς καὶ τῆς ὑγρᾶς 13
 ἐνίοις δυνάμεθα πολὺν χρόνον χρῆσθαι, οἷον τῇ
 35 γινομένη τροφῇ ἐξ ἀλφίτων καὶ ἀλεύρων καὶ τοῖς
 οἴνοις τοῖς αὐστηροῖς καὶ ὕδατι, τοῖς δὲ οὐ δυνά-
 μεθα, καὶ ταῦτα ἡδίοισιν οὖσιν; ἢ ὅτι τὰ μὲν ἐστὶ
 τῶν προσφερομένων ἐπιπολαστικά καὶ τρόφιμα,
 ὥστε καὶ ὅταν κενωθῶσιν, τῆς πρώτης τροφῆς
 ἀναλωθείσης ἔτι ἔνεστιν ἐν τῷ σώματι πολλή
 428 b δύναμις, ὡς μὲν πρὸς τὴν πρώτην ἐργασίαν τοῦ
 σώματος πεφθείσα, ὡς δὲ πρὸς τὸ τέλος καὶ τὴν
 ἐκ διαδοχῆς γινομένην ἄπεπτος; τοιαῦτα δὲ ἐστὶν
 καὶ τῶν ἡδέων τὰ πλείστα. τὰ μὲν γὰρ λιπαρὰ
 5 καὶ γλυκέα καὶ πίονα ἡδιστα δοκεῖ εἶναι γενομένοις
 ἡμῖν, ταῦτα δὲ ἐστὶ πάντα τὰ τρόφιμα καὶ οὐκ
 ἄπεπτα καὶ ἐπιπολαστικά, ἐν ἧ ἂν ἡ διαφορᾶ· ὥστε
 ἔναυλον εἶναι τὴν δύναμιν, εἴαν τις αὐτῶν πληρωθῇ
 καὶ μὴ ταχὺ ἐκλίπη τὴν αἴσθησιν. οὐ γὰρ μόνον
 ἐν τῇ κοιλίᾳ ἐνόντων γίνεται ἡ πλήρωσις, ἀλλὰ καὶ
 10 διαδοθείσης τῆς τροφῆς ἐν ἄλλοις μέρεσιν. ἢ οὐ
 μόνον τοῦτο αἴτιον, ἀλλὰ καὶ τὸ τῇ φύσει ἔνια
 σύμμετρα εἶναι καὶ οἰκεῖα ἡμῖν; πάντα γὰρ τὰ
 τοιαῦτα διὰ τὸ κατὰ φύσιν εἶναι μᾶλλον προσίεται
 τὰ σώματα, τὰ δὲ παρὰ φύσιν ἥττον. ἀλλὰ τε
 15 ἄλλη κράσει ἀρμόττει, οἷον τὸ μέλι ταῖς μελίτταις
 κατὰ φύσιν ἐστίν, ὥστε προσφέρεσθαι μόνον·
 καίτοι ἀσθενεῖς γέ εἰσι τὴν δύναμιν. ὥστε δεῖ
 λείπειν τὸ ἀναλισκόμενον, ἀλλ' εἶναι ἀνάλογον τὸ
 πλῆθος πρὸς τὴν ἰσχὺν τὴν ἀπὸ τῶν ἀνθρώπων·
 ὥστε ὅσα τῶν ἡδέων τοιαῦτά ἐστι, διὰ μὲν τὸ ἐν

PROBLEMS, XXI. 12-13

to the reasons given ; and because it always contains moisture it does not become hard.

Why is it that we can enjoy some types of food 13 both dry and wet for a long time, as for instance food which is made from barley-meal and wheat flour, wine which is dry, and water, but we cannot so enjoy others, in spite of the fact that these others are pleasanter ? Is it because the former lie on the surface and are nutritive, so that, when they are voided, although their first nutriment is expended they still have considerable effect on the body, being on the one hand concocted for their first action on the body, but unconcocted for the final action and its succeeding effect ? Most pleasant foods are of this character. For foods which are oily, sweet, and fat appear to us when we taste them most pleasant, but all such foods are nutritive and are not difficult of concoction and inclined to remain on the surface, although in other ways they may differ ; so their effect is lasting, if one is full of them and does not quickly lose sensation of them. For this feeling of satiety does not last merely while they are in the stomach, but also when the nutriment is distributed to other parts of the body. Perhaps this is not the only reason, but it may also be due to the fact that some foods are naturally in harmony with and natural to us. For our bodies are ready to take all such foods because they are natural, but less ready to take others which are unnatural. Different foods are suitable to different temperaments ; for instance, honey is so natural to bees that they take nothing else ; and yet they are weak in strength. So what they expend must be deficient, but the quantity must be proportionate to their strength, as man's to his ; hence all pleasant foods which are of this kind seem

928 b

20 τῆ φύσει ἥττον ὑπάρχειν ἡδέα φαίνεται, ὀλίγον δὲ χρόνον· εἶτα πληροῖ ταχύ. τῶν δὲ κατὰ φύσιν αἰεὶ δέονται, ὥστε καὶ προσφερομένων συνεχῶς δι' αὐτὰ οὐ τῶν ἡδίστων, ἀλλ' ἑτέρων ἥττον πληροῦνται.

Διὰ τί τὰ αὐτὰ συνεπιζομένοις τε ἡδέα φαίνεται 14 καὶ λίαν συνεχῶς προσφερομένοις οὐχ ἡδέα; τὸ δὲ ἔθος ἐστὶν τὸ πολλάκις καὶ συνεχῶς τι ποιεῖν. 25 ἢ ὅτι τὸ μὲν ἔθος ἕξιν δεκτικὴν τινος ἐν ἡμῖν ποιεῖ, οὐ πλήρωσιν, τὸ δὲ συνεχῶς προσφέρεσθαι τι πληροῖ τὴν ἐπιθυμίαν, καὶ καθάπερ ἀγγεῖον;¹ ἔστι γάρ τι κενὸν¹ ἢ ἐπιθυμία. αἱ μὲν οὖν ἕξεις γυμναζόμεναι αὖξονται καὶ ἐπιδιδόασιν· τὰ δὲ ἀγγεῖα 30 σαττόμενα οὐδὲν μείζω γίνεται. διόπερ τὸ μὲν ἔθος ὃν γυμνάσιον αὖξει τὴν δεκτικὴν ἕξιν· τὸ δὲ συνεχῶς προσφερόμενον σάπτει μὲν καὶ πληροῖ τὴν ἐπιθυμίαν, ἧς πληρωθείσης οὐκέτι προσιέμεθα, αὖξει δὲ οὐθὲν αὐτὴν διὰ τὰ προειρημένα ἐπὶ τῆς σάξεως. 35 ἔτι τὸ ἔθος οὐ τῷ αἰεὶ ἡδύνειν ἡδύ ἐστι (λυπεῖ γὰρ καὶ τὰ τοιαῦτα ἐάν τις συνεχῶς ποιῆ), ἀλλὰ τῷ τὴν ἀρχὴν τοῦ ἔργου ἡδέως ἡμᾶς προσίεσθαι, καὶ πλείω χρόνον δύνασθαι ταῦτόν ποιεῖν ἢ ἀσυνήθεις ὄντας. ἐν ᾧ οὖν καὶ τοῦτο λυπεῖ ἡδὺ ὄν, ἐν ταύτῳ καὶ τὰ ἄλλα ἡδέα. συνεχῶς γὰρ γινόμενα ἢ προσ- 929 a φερόμενα ἀμφοτέρα λυπεῖ. αἴτιον δὲ τὸ μὴ ἀπείρους ἡμᾶς ἐν αὐτοῖς δυνάμεις ἔχειν τὰς δεκτικὰς καὶ ποιητικὰς, ἀλλὰ πεπερασμένας, αἱ τυγχάνουσαι τοῦ συμμέτρου αὐταῖς (τοῦτο γὰρ συνεχῶς

¹ mss. have αἴτιον and καὶ for which Bonitz's readings have been adopted, although Th. G. seems to have had the text of the mss.

PROBLEMS, XXI. 13-14

to be pleasant because less of them exists naturally in us, and only for a short time; and then they quickly satisfy us. But men always crave for what is natural to them, so that they get less tired of foods continually taken other than those which are most pleasing in themselves.

Why do the same things seem sweet to us while 14 we are growing used to them, but less so if we take them too often? And yet habit consists in doing a thing often and continuously. Is it because habit produces in us a receptive condition, but not satiety, but to take a food continuously satisfies the appetite, and is like a vessel being filled? For the appetite is a kind of void. Now habits grow and increase by exercise; but vessels do not grow any bigger by being stuffed full. This is why custom being an exercise will increase the receptive habit; but that which is continually taken stuffs and sates the appetite, and when it is sated we no longer desire, nor can anything increase the appetite, because it is replete, as we have said before. Furthermore, custom is pleasant not because it is continually giving pleasure (for things of this kind actually cause pain, if one does them continuously), but because we approach the beginning of the process with pleasure, and we can do the same thing for a longer time than when we are unaccustomed to it. Then just as that which is pleasant can cause pain, so in the same way can all other pleasant things. For both if occurring or taken continuously cause pain. The explanation is that we have not unlimited powers either of reception or action, but limited ones, which when they have reached the point of saturation (and this becomes continually more perceptible with each

929^a ἔστιν αἰσθητὸν εἰς ἐπίδοσιν) αἰ μὲν πληροῦνται,
 5 αἰ δὲ ἀδυνατοῦσιν ἐνεργεῖν.

Διὰ τί τὸ μὲν σταῖς γίνεται τριβόμενον λευκόν, 15
 ἢ δὲ μάζα μελαντέρα; πότερον ὅτι ξηραίνεται
 μάλλον τὸ ἐπιπολῆς ἐν τῷ ἀλφίτῳ, τὸ δὲ ἐν ὑγρῷ
 θερμὸν [ὄ] ποιεῖ¹ τὴν λευκότητα; ἢ διὰ τὸ πεπυ-
 10 ρῶσθαι ἔλκει τὸ ὑγρὸν εἰς αὐτό, μεγαλομερέστερον
 ὄν;

Διὰ τί τὰ ἄλφιστα μάλλον τῷ ὕδατι συμμένει 16
 φυρώμενα ἢ τῷ ἐλαίῳ, ὄντι γλισχροτέρῳ; καίτοι
 κολλητικώτερον τὸ γλίσχρον, τὸ δὲ ἔλαιον τοῦ
 ὕδατος γλισχρότερον. ἢ ὅτι λεπτότερον τὸ ὕδωρ,
 15 ὥστε εἰσέρχεται εἰς ἅπαν καὶ μαλακὰ ποιεῖ, συμ-
 φύεται τε μάλλον καὶ συνθλίβεται πρὸς ἄλληλα,
 καίτοι θλιβόμενα καὶ χωρὶς τῆς τρίψεως;

Διὰ τί οἱ ἀτριπτοὶ ἄρτοι καὶ οἱ σφόδρα τετριμ- 17
 μένοι ῥήγνυνται; ἢ ὅτι οἱ μὲν ἀτριπτοὶ διὰ τὸ
 ἀσύνδετοι εἶναι; ἢ γὰρ τρίψις συνδεῖ· προωδο-
 20 ποίησθαι οὖν τῷ ῥήγνυσθαι. ἔτι ἀμιγῆς καὶ πολὺ
 ἔχουσιν τὸ ὑγρὸν. οἱ δὲ τετριμμένοι σφόδρα λίαν
 εἰσὶ ξηροὶ διὰ τὸ ὀλίγον ἔχειν ὑγρὸν· θερμαινο-
 μένων γὰρ πᾶν ἐξέρχεται. ὥστε ἀμφω διὰ τὸ
 πολὺ ὑγρὸν ἐξιέναι ῥήγνυνται· πολὺ γὰρ ἐν μὲν
 τοῖς ἀτρίπτοις ἀπλῶς ἐνεστιν, ἐν δὲ τοῖς τετριμ-
 μένοις πρὸς τὸ ὑπόλοιπον.

25 Διὰ τί κουφότερον τὸ φύραμα γίνεται ἢ ἀμφω, 18
 τό τε ὑγρὸν καὶ τὸ ἄλφιτον; πότερον ὅτι μιγνυ-
 μένων πνεῦμα συγκατακλείεται; ἢ ὅτι ὑπὸ τοῦ
 θερμοῦ τοῦ ἐν τοῖς ἀλφίτοις ἐξατμίζεται τοῦ
 ὕδατος, ὥστε ἔλαττον γίνεται τὸ μεμιγμένον;

¹ τὸ δὲ ἐν ὑγρῷ θερμὸν [ὄ] ποιεῖ Forster from Th. G.: οἶον
 ἐν ὑγρῷ θερμόν, ὃ ποιεῖ Ruelle.

PROBLEMS, XXI. 14-18

addition), in some cases are sated, and in others cannot function.

Why does dough become white when kneaded, but 15 barley-cake grow darker? Is it because in barley-meal the surface grows dry, and it is the heat in the moisture which causes the whiteness? Or does it draw the moisture to itself owing to exposure to the heat, because it consists of larger particles?

Why does barley-meal cohere better when mixed 16 with water than when mixed with oil, which is more viscous? Yet what is viscous is more adhesive, and oil is more viscous than water. Is it because water is lighter, so that it penetrates into every part and makes the grains soft, and so they grow more together and are crushed into each other, even if they are merely pressed, apart from being kneaded?

Why are both unkneaded and excessively kneaded 17 loaves easily broken up? In the case of unkneaded loaves is it because they are not bound together? For kneading binds them; so that they are pre-disposed to break up; also they contain a quantity of unmixed moisture. But the excessively kneaded are dry because they contain but little moisture; for it all escapes when they grow hot. So that both break because much of their moisture has escaped; for in the unkneaded bread there is much moisture at first, and in the overkneaded much (has escaped)^a in comparison with what is left behind.

Why is it that a mixture of liquid and barley-meal 18 is lighter than its two constituents? Is it because when they are mixed air is enclosed within? Or is it because evaporation of water takes place owing to the heat in the barley-meal, so that the mixture

^a Some such word must be supplied.

929 a ὁ δὲ ἀήρ, εἴ καὶ μίγνυται, οὐθὲν ἂν κουφότερον
80 ποιοῖ· ἔχει γὰρ βῆρος καὶ ὁ ἀήρ ἐν τῷ αἰέρι.

Διὰ τί μετὰ τοῦ ἀλφίτου πινόμενον τὸ γάλα καὶ 19
ὁ γλυκὺς φαίνεται γλυκύτερα; πότερον οὖν παρὰ
τὸ μὴ γλυκὺ μᾶλλον φαίνεται; τὸ γὰρ ἄλφιτον οὐ
γλυκὺ. ἢ ὅτι ἐνδιατρίβει τὸ ἄλφιτον ἔχον γλυκύ-
85 τητα, ὥστε πλείονι χρόνῳ ἢ αἴσθησις;

Διὰ τί ἤττον ἄκρατον φαίνεται τὸ αὐτὸ πόμα 20
μετὰ τοῦ ἀλφίτου πινόμενον; πότερον ἢ ὅτι κε-
ράννυσιν ἄλλο ἔχον μετ' ἄλλου; ἢ ὅτι ἀντιφράττει
τῷ πόματι καὶ ἀφανίζει, ἀντισπῶν εἰς αὐτό;

929 b Διὰ τί ὁ χόνδρος πλείον ὕδωρ δέχεται ἢ οἱ πυροὶ 21
ἐξ ὧν ὁ τοιοῦτος ἐγένετο χόνδρος; ἢ ὅτι ἄλευρά
πῶς ἐστὶν ὁ χόνδρος, τὰ δὲ ἄλευρα πλείον δέχεται;
καὶ γὰρ γίνεται ὁ ὄγκος πλείων ἢ ὁ τῶν πυρῶν·
3 σέσακται γὰρ καὶ τὰ ἐν τοῖς πυροῖς. τὰ δὲ πλείω
χωρεῖ πλείον, καὶ (διὰ)¹ τοῦτο καὶ ὅτι ἔχει θερμό-
τητα καὶ τὰ ἄλευρα καὶ ὁ χόνδρος. τὸ δὲ θερμὸν
καὶ ἔλκει μᾶλλον τὸ ὑγρὸν, καὶ ἐξαναλίσκει
ἐξατμίζον.

Διὰ τί τὸ ἄλευρον τριβόμενον μεῖζον πολὺ 22
γίνεται ἢ τὸ ἄλφιτον κατὰ λόγον; ἢ ὅτι τὸ μὲν
10 πολὺ ὕδωρ δέχεται, τὸ δὲ ὀλίγον; διὰ τί δὲ
δέχεται πλείον; μᾶλλον γὰρ εἰκὸς τὸ ἄλφιτον·
πεπύρωται γάρ, τὸ δὲ ἄπυρον· μᾶλλον δὲ ξηρὸν
τὸ πεπυρωμένον. ἢ διότι τρῖψιν μᾶλλον δέχεται
τὸ ἄλευρον; τούτου δὲ αἴτιον τὸ μικρομερέστε-
ρον εἶναι. ὥσπερ οὖν ὄσαπλάσιον δυνάμει ἐστὶ
456

PROBLEMS, XXI. 18-22

becomes smaller? But the air, even if it were mixed with it, would not make it lighter; for air in air has weight.

Why do milk and sweet wine taste more sweet if drunk with barley-meal? Does it appear to be so by contrast with what is not sweet? For barley-meal is not sweet. Or is it because the barley-meal retains the sweetness, so that the perception of it lasts longer?

Why does the same drink seem weaker when drunk with barley-meal? Is it because the barley-meal mixes two substances of different qualities? Or is it because it counteracts the drink and destroys it, absorbing it into itself?

Why will gruel take more water than the wheat out of which such gruel is made? Is it because the gruel is in a sense wheaten flour, and wheaten flour absorbs more moisture? For its bulk is greater than that of wheat; for in the grain the wheat is tight packed. That which is more holds more for this reason and also because both the wheat flour and the gruel contain heat. The heat also draws out the moisture more and expends it by evaporation.

Why does wheaten flour increase in bulk when it is kneaded more in proportion than barley-meal? Is it because the former absorbs much water, the latter only a little? But why does it absorb more? For barley-meal should do so; for it has been heated, while the wheat flour has not; and what has been heated is drier. Is it because the wheaten flour admits more kneading? The reason of this is that it is made up of very small particles. In proportion, then, as it is potentially more divisible because of the

¹ <διὰ> added by Bonitz.

929 b

15 τῆ μικρότητι, τοσαυταπλάσιον δέχεται τὸ ὕδωρ. κόλλη γὰρ χρήται τῷ ὕδατι, ὥσπερ καὶ Ἐμπεδοκλῆς μετήνευκεν ἐν τοῖς Φυσικοῖς εἰπὼν “ ἄλφιδον ὕδατι κολλήσας.” καὶ ἀναλίσκει πολὺ διὰ τοῦτο.

Διὰ τί δὲ καὶ πεπυρωμένον τὸ σταῖς μεῖζον 23 γίνεται ἢ ἡ μᾶζα; ἢ ὅτι ἔχει ὑγρὸν οὐ κεχωρισμένον, ὥστε ἐξιέναι θερμαινόμενον, ὁ¹ πνεῦμα γινόμενον, καὶ οὐ δυνάμενον ἐξιέναι ὁμοίως καὶ ἐν τῇ μάζῃ διὰ τὴν πυκνότητα τοῦ σταϊτός (πυκνὸν γὰρ τὸ ἐκ μικρομερεστέρων), αἶρει [οὖν] καὶ ποιεῖ τὸν ὄγκον; ἔτι δὲ καὶ πλείον ἔχει τὸ ὑγρὸν, ἐξ οὗ θερμαινόμενον πνεῦμα γίνεται· ἐκ δὲ τοῦ πλείονος 25 ἀνάγκη γίνεσθαι πλείον.

Διὰ τί οἱ περὶ τὴν τῶν σίτων ἐργασίαν, οἱ μὲν 24 περὶ τὰς κριθὰς ἄχροι γίνονται καὶ καταρροϊκοί, οἱ δὲ περὶ τοὺς πυροὺς εὐεκτικοί; ἢ διότι εὐπεπτότερος ὁ πυρὸς τῆς κριθῆς, διόπερ καὶ αἱ ἀπόρροιαί;

30 Διὰ τί ὁ ἄρτος, εἰ μὲν τις αὐτὸν ὀπτᾶ, σκληρότερος γίνεται, εἰ δὲ τις αὐτὸν χλιαίνῃ, ὑγρότερος ἄχρι τινός; ἢ ὅτι ὀπτωμένου αὐτοῦ τὸ ὑγρὸν ἐκπορεύεται; σκληρότερος οὖν γίνεται· ἐπιθερμαινόμενον δὲ τὸ ὑγρὸν συσταθὲν διαχεῖται ὑπὸ τοῦ πυρός, διὸ ὑγρότεροι γίνονται.

35 Διὰ τί τὰ μὲν ἄλευρα ψυχόμενα ἥττον σάπτεται, 26 τὰ δὲ ἄλφιστα μᾶλλον; ἢ ὅτι τὰ μὲν μικρομερῆ οὐ διαλείπει χώραν, καὶ τὰ βαρέα τῇ θλίψει τὰ πλείω <ἢ>² ἐλάττω κατέχει τὸ ἴσον; τὰ μὲν οὖν ἄλφιστα

¹ ὁ Bonitz : οὐ Ruelle.

² <ἢ> added by Forster,

PROBLEMS, XXI. 22-26

smallness of its parts, in such proportion does it absorb more water. For it uses water as a glue—a metaphor employed by Empedocles in his *Physics* in the words “Glueing wheaten flour with water.” It employs much water in this way.

Why does dough when heated become greater in 23 bulk than barley-cake? Is it because its moisture is not separated, so as to escape under the influence of heat? This moisture, becoming breath and being unable to escape to the same extent as in barley-cake owing to the density of the dough (for what consists of very small parts is dense), raises it and causes it to swell. Also it contains more moisture, from which when heated is generated breath; and from a larger quantity of moisture more breath must be produced.

Why is it that of those whose work lies with grain, 24 those who deal with barley are pallid and inclined to catarrh, while those who deal with wheat are healthy? Is it because wheat is more digestible than barley, and so are the emanations from it? ^a

Why is it that a loaf of bread if one toasts it be- 25 comes harder, but if one only warms it, it becomes up to a point moister? Is it because the moisture escapes when it is toasted? Hence it becomes harder; but if it is only warmed the liquid which has congealed is again softened by the fire, so that the bread becomes moister.

Why is it that wheaten flour grows less thick as it 26 cools, whereas barley-meal becomes thicker? Is it because finely divided flour allows no interstices, but heavy things owing to their pressure, whether more or fewer, occupy equal space? And barley-meal is

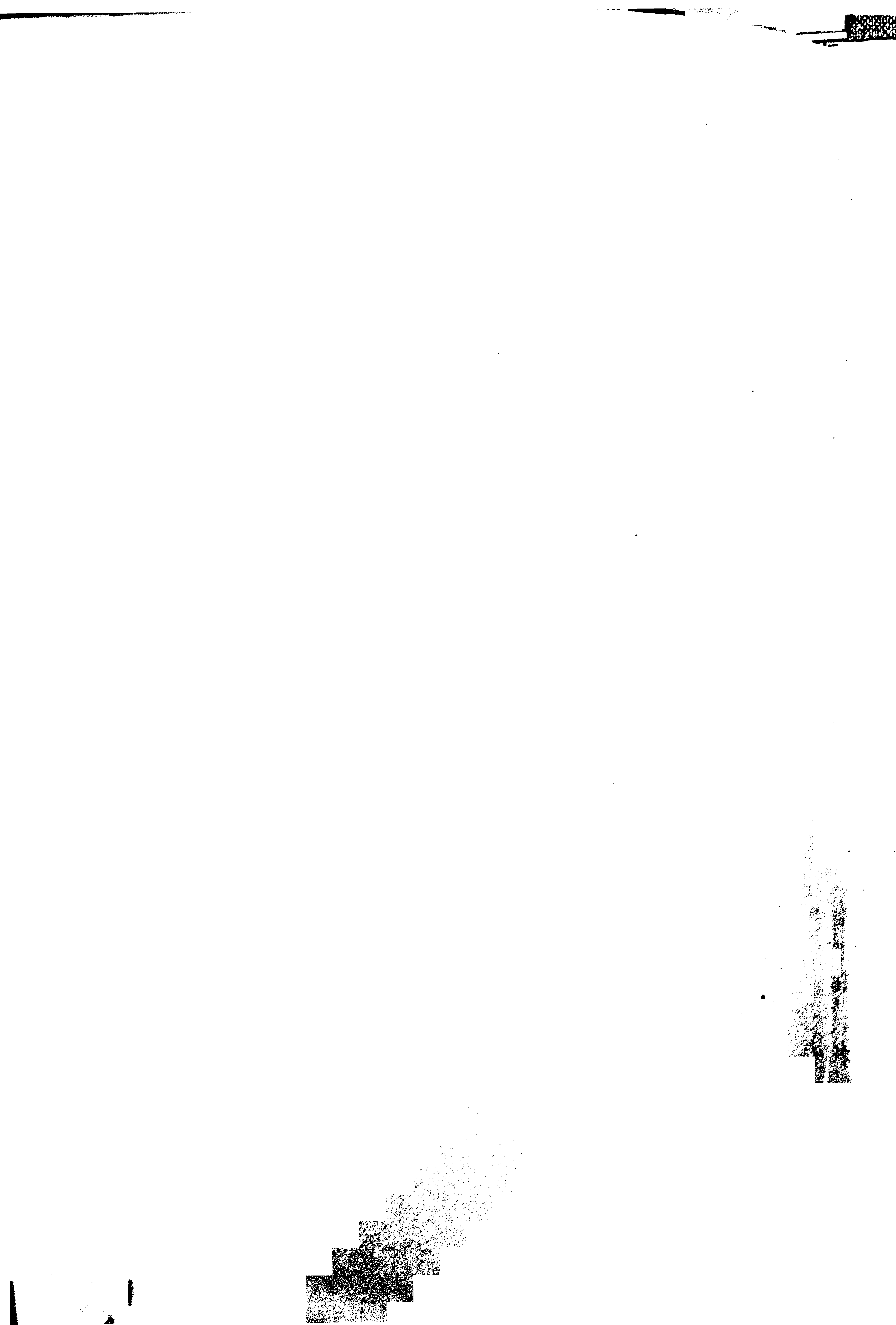
^a Cf. Bk. XXXVIII. 10.

PROBLEMS, XXI. 26

coarse. As it cools it grows less, so that the less is more compressed. But wheaten flour is finely divided to begin with, so that it does not cool on this account, but so as to become lighter and not to thicken owing to pressure ; for wheaten flour is by nature heavier than barley-meal.

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