

Lucretius' Olfactory Theory in *De rerum natura* IV

1. Introduction

One of the main themes of Lucretius' *De rerum natura* book IV is the mechanism of sense perception. Nearly two third of this book is devoted to expositions on *simulacra*, vision, hearing, taste, smell and mental perception.¹ On some of the points and problems in the account of smell (IV.673-715) this paper will be focused.

The nucleus of Lucretius' olfactory explanation could be described as follows: a smell consists of a flow of atoms which have been emitted from deep within the sense object and scattered in all directions; when such an effluence of atoms comes into contact with the nostrils, the olfactory sense is activated.

On the whole, this explanation does not depart from the olfactory account of Epicurus' own hand in *Letter to Herodotus* 53; some of the details with which Epicurus provides us, will be discussed on p. 169-170 below.

With reference to *DRN* II.414-415 and to the relevant sections of the Epicurean theories of vision, hearing and taste,² we might assume that the odour-constituting atoms come into contact with the nostrils while penetrating them by means of the *foramina* (inter-atomic passages, πόροι). Against this background it becomes understandable why the Epicurean explanation of smell, unlike many other ancient theories on the subject,³ does not assign a function to respiration in the olfactory process. Compare e.g.:

- a. the olfactory theory, attributed to Alcmaeon in *Thphr. Sens.* 25 and *Aet.* IV.17.1, which states that by means of respiration odours are drawn in and led to the brain

¹ Lucretius offers no separate treatment of the sense of touch. Short (and sometimes implicit) statements concerning this sense are found in e.g. *DRN* II.433; III.551-552, 631; IV.230-235, 265-268, 487, 491; V.102; VI.779 (cp. on this issue also Schoenheim (1966) 81-87). Epicurus probably wrote a monograph on the subject: Περὶ ἄφῆς (D.L. X.28), but none of his expositions on the sense of touch have come down to us. *PHerc.*19/698 contains explanations of a later Epicurean (possibly Philodemus) on touch, cp. Long & Sedley (1987) 16C; Sedley (1989a).

² Vision: *Epicur. Ep. Hdt.* 49; *Lucr. DRN* IV.331, 719; *Diog. Oen. Fr.* 9.II.11 Smith (testimonia: *Cic. Fam.* XV.16.1; *Aet.* IV.13.1; *Gel.* V.16.3); hearing: *DRN* IV.525, 544, 568 (testimonia: *Aet.* IV.19.2); taste: *DRN* II.684-685; IV.660, 662, 670.

³ E.g. the olfactory explanations attributed to Alcmaeon (*ap. Thphr. Sens.* 25; *Aet.* IV.17.1), Empedocles (*ap. Thphr. Sens.* 9, 21, 22; *Aet.* IV.17.2), Anaxagoras (*ap. Thphr. Sens.* 28), Clidemus (*ap. Thphr. Sens.* 38) and Galens explanations on olfaction in *De instrum. odor.* 1.2-3; 3.8-10 Kollersch (= II.865-866 Kühn).

(Alcmaeon regarded the brain as the organizing centre of sensation). The Epicurean atomic effluences can penetrate the πόροι of the nostrils by themselves, so they do not have to be drawn in by respiration.

- b. The view of Aristotle (*de An.* II.421b26 ff.; *Sens.* V.443a2-8, 444b7-13) and Theophrastus (*ap. Priscian. Metaphr.* 1.35, 277B34-37 FHG&S) that in non-aquatic animals respiration serves to open up the covered (i.e. furnished with a πῶμα) vessels (φλέβες) and passages (πόροι) of their organ of smell.⁴ In the Epicurean theory such an opening up is not needed because in all living beings the interatomic πόροι of the organ of smell provide permanent openings which allow the effluences to penetrate the nostrils.

If, for a moment, we go on to explore the area of non-Epicurean reflections on olfaction, one of the interesting facts one comes across is that an explanation of the nature of smells in terms of effluences was quite widely accepted:

- i. as can be inferred from the citations below, not only materialist philosophers and physicians like Empedocles, Democritus and Erasistratus, but also Aristotle's⁵ successor Theophrastus⁶ as well as the Stoics regarded smell as a material efflux:
- Emp. *ap. Thphr. Sens.* 9 (DK 31 A 86 partly): ὁσμὴν δὲ πλείστην ἀπὸ τῶν λεπτῶν καὶ τῶν κούφων ἀπορρεῖν, Plut. *Qaest. Nat.* 917e (DK 31 B 101): οἱ κύνες, ὡς φησιν ὁ Ἐ., τὰς ἀπορροὰς ἀναλαμβάνουσιν, ἅς ἐναπολείπει τὰ θηρία τῇ ὕλῃ,
 - Democr. *ap. Thphr. Sens.* 82 (DK 68 A 135 partly): τὸ λεπτὸν ἀπορρέον ἀπὸ τῶν βαρέων ποιεῖ τὴν ὁσμὴν,
 - Erasistr. and his followers in *An. Lond.* 33.21-22: [dogs smell the tracks along which beasts have passed] ...ὅτι τῆς ἀπὸ τῶν θηρίων ἀποφορᾶς προσκαθιζούσης πρὸς τὰς ἀτραπούς,
 - Thphr. *Sens.* 20: τὰς ὁσμάς ἀπορροῇ γίνεσθαι, *ibid.* 90: περὶ δὲ τῆς ὁσμῆς ὅτι μὲν ἀπορροή τις ἐστὶ (καὶ ἀνάπνευσις τοῦ ἀέρος)⁷ σχεδὸν ὁμολογεῖται (see also: *CP* VI.9.3; VI.14.11; VI.16.8; *Od.* 45).
 - the Stoics *ap. Gal. De instrum. odor.* 3 (SVF II 859 = 2.11-12 Kollesch = II.862 Kühn): μεταξὺ δὲ ἀέρος τε καὶ ὑγροῦ [καὶ πυρὸς: *secl. von Arnim*] τὸ τῆς ὁσφρήσεως ἐστὶν αἰσθητόν, οὐθ' οὕτω λεπτομερὲς ὑπάρχον, ὡς ὁ ἀήρ, οὐθ' οὕτω παχυμερές, ὡς τὸ ὑγρόν. ὅσον γὰρ ἀπορρεῖ τῶν σωμάτων ἐκάστου, τοῦτ' ἐστὶ τῶν ὁσφρητῶν ἡ οὐσία.
- ii. In Plato's *Timaeus* (66d-67a) it is stated that smells are either (a) vapour (δμίχλη) or (b) smoke (καπνός) and that they occur (a) when air is changing into water or

⁴ This theory is criticized by Galen (*De instrum. odor.* 5.2-5.30 Kollesch = II.871-882 Kühn).

⁵ Aristotle denies the effluence theory (*Sens.* V.443b1-2), he regards smell as an affection of the intervening medium; it is transmitted by the action of its source on the medium (air or water), see e.g. *de An.* III.434b15.

⁶ According to Theophrastus a smell consists of a fiery efflux, cp. Sedley (1985) 206-207, who convincingly argues against Sharples (1985) 194 (cp. also Sharples (1995) 203-204), where a 'mixed theory' is attributed to Theophrastus (i.e. an explanation of smell in terms of effluences from the object of smell affecting the intervening air).

⁷ For olfactory theories assigning a function to respiration, *supra* 163 and n. 3.

(b) when water is changing into air. In Aristot. *Sens.* V.443a (DK 22 B 7 partly) Heraclitus is implicitly credited with the *doxa* that smells are a καπνώδης ἀναθυμίασις.⁸ These καπνός theories might also be included in the category of explanations in terms of effluences, for, as appears from Aristot. *Sens.* V.443b, in antiquity the καπνός explanation of smells was considered to be like the effluence explanation (or even identified with it, see Philop. *in DA II.9* (cited p. 168 below)).

On the basis of these *doxai*, and particularly Thphr. *Sens.* 90, one might assume that the Epicurean theory of olfactory effluences was less controversial than their explanation of vision in terms of effluent images.⁹

2. *De rerum natura* IV.673-676, 677-686

Section 1 (IV.673-676) and 2 (IV.677-686) of Lucretius' olfactory account run as follows:¹⁰

Nunc age quo pacto naris adiectus odoris
 tangat agam. primum res multas esse necesest
 675 unde fluens volvat varius se fluctus odorum,
 et fluere et mitti vulgo spargique putandumst.
 verum aliis alius magis est animantibus aptus
 dissimilis propter formas, ideoque per auras
 mellis apes quamvis longe ducuntur odore,
 680 vulturique cadaveribus. tum fissa ferarum
 ungula quo tulerit gressum promissa canum vis
 ducit, et humanum longe praesentit odorem
 Romulidarum arcis servator candidus anser.
 sic aliis alius nidor datus ad sua quemque
 685 pabula ducit et a taetro resilire veneno
 cogit, eoque modo servantur saecula ferarum.

2.1. *DRN* IV.673-676

Reading the first section, one of the first things one notices is the emphatic way Lucretius introduces the concept of smells being effluences: ... fluens volvat ... se fluctus odorum et fluere ... (IV.675-676). This emphatic introduction of the effluence concept leads us to the observation that the account of sense perception in book IV is arranged as a ring composition: on the one hand the explanation of smell is connected with the discussion of vision in IV.216-521, in as much as this latter discussion is based on a detailed treatment (IV.54-215) of (mainly visual) effluences and as it explains vision as caused by these visual effluences. On the other hand the treatment of olfaction stands apart from the immediately foregoing explanations of hearing in IV.522-614 and taste in IV.615-672, where no references to a flowing

⁸ Cf. Beare (1906) 149; Ross (1906) *ad loc.*; Siwek (1963) 104.

⁹ Polemics against the atomistic/Epicurean εἰδωλα theory of vision are found in: Cic. *Fam.* XV.16.1; Alex. Aphr. *An. c. Mant.* 134,28-136,28 Bruns; Macrobi. *Sat.* VII.14,5-12.

¹⁰ Citations of *DRN* are, unless stated otherwise, from the edition of Bailey (1947). His punctuation of IV.673-715 has been changed in IV.676, 678, 688, 691, 692, 693, 694, 697.

away of the relevant auditory and gustatory particles are found.¹¹ One might also say that Lucretius' accounts of vision and olfaction deal with 'automatical emissions': aggregates of atoms which arise and flow from the sense object by themselves (as a result of the inner-atomic vibration, *πάλσις*, which takes place within each object), while the accounts of hearing and taste in IV.522-672 deal with what could be termed as 'non-automatical emissions', i.e.

- a. aggregates of voice-constituting atoms which the speaking person squeezes out from deep down in his body and sends straight out of his mouth,¹² cp. IV.549-550: *hasce ... penitus voces ... corpore nostro / exprimimus rectoque foras emittimus ore*,¹³
- b. aggregates of flavour (*sucus*)¹⁴-constituting atoms which the percipient extracts from the object of sense (food), by mastication, cp. IV.617-618: *cibum ... madendo exprimimus*.¹⁵

Before making a suggestion as to the motivation for the ring composition under consideration, we try to answer the question if Lucretius' arrangement of his material on the senses could have been his own invention.

Beginning from the rather wide perspective of the ancient explanations and doxographies on the senses handed down to us, one gets the impression that there was no completely standardized sequence of topics: as a rule, the epistemologically most important senses, vision and hearing, come first, but the order in which the other senses are explained varies, cp. for example:

- Plato *Tim.* 45b-46c: construction of the eye and explanation of sight, dreams and mirror images, 46e-47c: benefits of sight, 47c-d: benefits of sound and hearing, 61c-64a: tactile properties and their effect on the percipient's body, 64a-65b: relation of perceptions to pleasure and pain, 65b-66c: gustatory properties and the effects of elementary particles on the tongue, 66d-67a: smells and the power of the nostrils, 67a-c: hearing and sounds, 67c-68d: colours,¹⁶

¹¹ Cp. the use of *fluant* (IV.144), *fluere* (IV.157), *fluunt* (IV.334), (*de rebus*) *abundant* (IV.145), (*hinc* [sc. from the mirror]) *redundent* (IV.154) to refer to the flowing or abundant streaming away of the *simulacra*, whereas IV.522-614 and 615-672 contain no references to a flowing or streaming away of the relevant particles.

¹² Cp. also IV.541: *multa loquens ... amittit de corpore partem*; Epic. *Ep. Hdt.* 53: ...εὐθὺς τὴν γινόμενην πληγὴν ἐν ἡμῖν, ὅταν φωνὴν ἀφίωμεν...

¹³ From *DRN* IV.585, 588; VI.171-172 it might be inferred that in the case of inanimate entities producing sound, the emission of sound constituting particles is prompted by an external cause (here, successively, the touching of fingers, blows of breath, collision of clouds), IV.585: (sc. *dulcis querellas*) *tibia quas fundit digitis pulsata canentum*; IV.588: (sc. Pan) *unco ... labro calamos percurrit hiantis*, VI.171-172: (sc. *tonitrus*) *pariter qui mittitur igni / e simili causa, concursu natus eodem*.

¹⁴ For the use in IV.615-672 of the term *sucus* to denote flavour, see Rosenmeyer (1996) 138-139.

¹⁵ As a matter of fact in some cases taste might be effected by 'automatical emissions'. This could be detected from IV.221-224 (from the pericope on effluences), where it is stated that, when we are walking by the sea, we perceive the salty taste of sea water and that, when we are watching wormwood being diluted and mixed, its bitter taste touches us (in both cases the liquid does not 'enter' our mouth). Probably taste is effected by 'automatical emissions' if the sense object is liquid, and by 'non-automatical emissions' if the sense object is non liquid.

¹⁶ This overview is partly derived from Long (1996b) 348.

- Arist. *de An.* II.418a-419b: vision, colour and light, 419b-421a: hearing, echo, voice, 421a-422a: smell, 422a-422b: taste, 422b-423b: touch,
- id. *Sens.* I.437a-III.440b: vision, hearing, colour, IV.441a-442b: taste, V.442b-445b: smell,
- Thphr. *Sens.* 5-6 (on Plato): vision and colour, hearing, smell, taste, touch, 7-11 (on Empedocles): vision, colour, construction of the eye, hearing, smell, taste, touch, pleasure and pain (and thought) 25-26 (on Alcmaeon): hearing, smell, taste, vision, 27-28 (on Anaxagoras): vision, touch, taste, smell, hearing, 38 (on Clidemus): vision, hearing, smell, taste, 39-40 (on Diogenes of Apollonia) smell, hearing, vision, taste, 49-58 (on Democritus) vision, hearing, ‘the other senses’ (and thought),
- the Stoics *ap. Aet.* IV.10.1: vision, hearing, smell, taste, touch,
- *Aet.* IV.13: vision, IV.14: mirror images, IV.15: whether darkness is visible, IV.16: hearing, IV.17: olfaction, IV.18 (only in Ps.Plut.): taste, IV.19: voice, IV.20 (only in Ps.Plut.): whether the voice is incorporeal and how the echo comes about.¹⁷

If one studies the Epicurean background it appears that Lucretius’ arrangement does not go back to Epicurus’ rather condensed exposition on perception in *Letter to Herodotus* (46-53). This exposition deals successively with effluences, vision, thought, hearing and smell; it is silent on taste¹⁸ and treats vision and thought, which are both produced by εἶδωλα,¹⁹ as one issue (cp. Diog. Oen. Fr. 9.II-III Smith, where a section on vision is followed by one on mental perception). But the relevant section of Epicurus’ *On Nature* (book III and IV, as reconstructed by David Sedley),²⁰ might provide us with a bit of more conclusive evidence. As Sedley will explain in his forthcoming book on Lucretius,²¹ a tiny papyrus fragment attributed to Philodemus (*De morte lib. inc.*, PHerc. 807 fr. 6 (= fr. 80 Us)) contains an explicit citation of ‘*On Nature* book IV’ and the context of this citation allows the assumption that in *On Nature* book III and IV thinking was dealt with after sense perception. Against this background it cannot be excluded that the whole arrangement of topics in *DRN* IV.216-822 reflects the arrangement of *On Nature* book III and IV.

If we finally return to the question what might have motivated the ring composition under discussion, the answer might be that smell, which is — apart from vision — the only sense effected exclusively by ‘automatic emissions’, is the best candidate to pave the way for the explanation of mental perception, because in this latter part of the Epicurean theory an important role is attributed to images which have flown away from objects (cp. *DRN* IV.737-738; *Epic. Ep. Hdt.* 49; *Aet.* IV.8.10). To make the transition from the explanations on the senses to an account of mental perception

¹⁷ The account on sense perception in *DRN* IV also contains explanations on mirrors (IV.269-323) and the echo (IV.563-594). The former explanations are analysed and confronted with the ancient theories of vision in Koenen (1995) (cp. also *id.* 1996, on the account of concave mirrors in IV.311-317).

¹⁸ No exposition on taste of Epicurus’ own hand has come down to us.

¹⁹ From *DRN* IV.728-729 we learn that the images producing mental perception are much finer than the ones producing vision. The connection between vision and thought, hinted at in the later version of the programmatic introduction in book IV (33-34), is made explicitly clear in IV.749-756. (For the question of the two alternative programmatic passages in book IV, see now Sedley in this volume (9).)

²⁰ See Chart 1, p. 3 in this volume.

²¹ Thanks are due to David Sedley who kindly sent me the relevant extract from his forthcoming book.

still smoother, Lucretius (perhaps again following the lead of Epicurus' *On Nature*) concludes the part on smell with a brief paragraph on relative effects of vision (IV.706-721), in which the notion of effluent images returns (IV.714-721).

Considering the word *multas* (IV.674), one might ask: if apparently not all objects emit a stream of odour-constituting particles,²² which completely odourless objects Lucretius and his ancient readers, thanks to personal observation or/and reading knowledge, might have been thinking of? *De rerum natura* never explicitly mentions odourless objects. It only contains an implicit reference to a not completely odourless substance, cp. II.849-854 where it is pointed out that the olive oil to be used as a base of perfumed ointments should be as odourless as possible. There are however olfactory expositions offered by Plato, Aristotle and Theophrastus which provide us with some instances of objects being thought of as completely odourless:

- Plato *Tim.* 66d4-7: ἡμῶν αἱ περὶ ταῦτα φλέβες [sc. the vessels involved in smelling] πρὸς μὲν τὰ γῆς ὕδατός τε γένη στενότεραι συνέστησαν, πρὸς δὲ τὰ πυρὸς ἀέρος τε εὐρύτεραι, διὸ τούτων οὐδεὶς οὐδενὸς ὀσμῆς πάποτε ἦσθετό τινος...
- Arist. *Sens.* V.443a9-17: τὰ ... στοιχεῖα ἄοσμα, οἶον πῦρ ἀῆρ ὕδωρ γῆ²³ ... λίθος ... ἄοσμον ... χρυσὸς ἄοσμον...
- Thphr. *Od.* 1: τὰ ἀπλᾶ ἄοσμα, οἶον ὕδωρ ἀῆρ πῦρ· ἡ δὲ γῆ μάλιστα μόνη ὀσμὴν ἔχει διὸ μάλιστα μικτή (also Thphr. *Sens.* 22; *CP* VI.19,2), id. *CP* VI.9,3: ...τῶν ξηρῶν, ἄοσμον δὲ τελέως (οἶον φακοῦ [lentils] κνήκου [safflower] τῶν τοιούτων)...
ibid. VI.19,2: τῶν δὲ ξηρῶν, μάλιστα μὲν ὄσα μανὰ καὶ ἄοσμα καὶ ἄχυλα καθάπερ ἔρια καὶ τὰ ἰμάτια...

The last clause of Lucretius' first section (IV.676) focuses on the scattering in all directions of the atomic flow of odours: [sc. *fluctus odorum*] *mitti vulgo spargique*. Thanks to this concept the Epicurean theory of olfaction is not susceptible to such criticism as was directed by Philoponus against Plato's explanation that smells are either vapour (δμίχλη) or smoke (καπνός):²⁴ (paraphrase) if one suspends bait above the water surface its effluence cannot travel downwards and therefore the bait should not be smelled by water animals (Philop. *in DA II.9* (392,11-14 Hayduck): ...πῶς τὰ ἔνυδρα ὀσφραίνονται τῶν ὑπὲρ τὴν ἐπιφάνειαν τοῦ ὕδατος; οὐ γὰρ εἰκόσ ἐστι τὴν ἀπόρροϊαν ταύτην [sc. the effluence which comes from the bait suspended above the water surface] διὰ τοῦ ὕδατος κάτω χωρεῖν, ἀλλὰ μᾶλλον ἄνω, εἴτε ἀτμιδώδης ἢν εἴτε καπνώδης, ὡς ἐφεξῆς [sc. Plato] ἐρεῖ.)

2.2. DRN IV.677-686

In the second section Lucretius deals in extenso with the phenomenon that one smell is more fitted to some creatures and another to others. His actual explanation, however,

²² Cp. also II.834-835: non omnia corpora vocem mittere ... neque odorem; IV.218 (= VI.924): *perpetuoque fluunt certis ab rebus odores*.

²³ Excluded by Thphr. *Od.* 1, see below.

²⁴ For this theory cp. *supra* 164.

is highly condensed: *dissimilis propter formas*, because of the unlike shapes (IV.678). With the help of the foregoing treatment of taste (particularly IV.643-662) and a short statement on odours in book II (414-417), this explanation could be filled in as follows: because of (a) the different shapes, sizes and mixtures of the atoms generating the odours, (b) as well as differences in the atomic structure of the perceiving nostrils (cp. IV.649-650: *...differre necessessest, / intervalla viasque, foramina quae perhibemus, / omnibus in membris...*).²⁵

Further elucidation might be gained from the explanation of smell in Epic. *Ep. Hdt.* 53 (I give the text as printed by Long & Sedley and Usener):

καὶ μὴν καὶ τὴν ὁσμὴν νομιστέον, ὥσπερ καὶ τὴν ἀκοὴν, οὐκ ἄν ποτε οὐθὲν πάθος ἐργάσασθαι, εἰ μὴ ὄγκοι τινὲς ἦσαν ἀπὸ τοῦ πράγματος ἀποφερόμενοι σύμμετροι πρὸς τὸ τοῦτο τὸ αἰσθητήριον κινεῖν, οἱ μὲν τοῖοι τεταραγμένως καὶ ἀλλοτρίως, οἱ δὲ τοῖοι ἀταράχως καὶ οἰκειῶς ἔχοντες.

Transl.: and further we must believe that smell too, just like [the atoms producing] hearing, would never cause any effect, if there were not certain masses moving away from the object and being commensurate for moving the sense organ under consideration, some kinds being in disorder and alien, others free from disorder and akin.

From the protasis it appears that, according to Epicurus, smell causes a πάθος. Bailey (1947) 1257; 1261 claims that this term 'suggests a subjective element'. This interpretation, which is based on a highly polemical statement on the Epicurean explanation of taste in Plut. *Adv. Col.* 1121c (= fr. 324 Us.),²⁶ where the word πάθος is used to refer to the opposite of an objective, external reality, seems not to be wholly correct: if one relates Epicurus' use of the term πάθος to his immediately foregoing explanation of hearing in *Ep. Hdt.* 52: ἀλλὰ μὴν καὶ τὸ ἀκούειν γίνεται πνεύματός²⁷ τινος φερομένου ἀπὸ τοῦ φωνοῦντος ἢ ἠχοῦντος ἢ ψοφοῦντος ἢ ὅπως δήποτε ἀκουστικὸν πάθος παρασκευάζοντος as well as to the testimonium on the atomic theory of vision in Aet. IV.13.1 (Stobaeus):²⁸ Λεύκιππος Δημόκριτος Ἐπίκουρος κατὰ εἰδώλων εἴσκρισιν οἶονται τὸ δρατικὸν συμβαίνειν πάθος,²⁹ one gets the impression that Epicurus uses πάθος to refer in a general and neutral way to the effect, caused by particles which are emitted from the sense object, on the sense organ. On the basis of *DRN* IV.332-336, 642-672 and 706-721, one could say at the most that smell, as much as the other objects of sensation, in some cases might be relative: the disposition of the sense organ might have an effect on the way the configuration of sensory particles will be perceived.

The concluding clause of *Ep. Hdt.* 53 (οἱ μὲν etc.) provides us with information about olfactory ὄγκοι (masses: agglomerations of atoms).³⁰ It is stated that they are

²⁵ Cp. also Merrill, Giussani, Leonard & Smith, Bailey, Godwin *ad loc.* and *supra* 163.

²⁶ τῷ λεγομένῳ περὶ τῆς γεύσεως, ὅτι τὸ ἐκτὸς οὐ φησιν εἶναι γλυκὺ, πάθος δὲ τι καὶ κίνημα περὶ αὐτὴν γεγονέναι τοιούτου.

²⁷ For the text, see Long & Sedley (1987) 15A.

²⁸ Ps.Plut. reads: Δημόκριτος Ἐπίκουρος κατ' εἰδώλων εἰσκρίσεις φωντο τὸ δρατικὸν συμβαίνειν...

²⁹ Cp. also the use of πάθος in Pla. *Tht.* 193c: τὰ ἐν τοῖς κατόπτροις τῆς ὄψεως πάθη (and LSJ *ad loc.*), Aristot. *Sens.* IV.440b28-30: περὶ δὲ ὁσμῆς καὶ χυμοῦ νῦν λεκτέον. σχεδὸν γὰρ ἐστὶ τὸ αὐτὸ πάθος...; Thphr. *CP* VI.1.1: καὶ σχεδὸν τὸ αὐτὸ πάθος ἐστὶ χυλοῦ τε καὶ ὁσμῆς.

³⁰ Cp. the use of ὄγκοι in *Ep. Hdt.* 52-53 to refer to the auditory masses. For the terminology, cp. Bailey (1928) 577-578; Rosenmeyer (1996) 141.

commensurate (σύμμετροι), sc. with the atomic structure of the organ of smell,³¹ so that they move it. Some of them are τεταραγμένως καὶ ἀλλοτριώς, in disorder and alien (sc. to the passages of the nostrils), while others are ἀταράχως καὶ οἰκείως, free from disorder and akin (sc. to them). Probably masses of the second category form the odours which Lucretius in IV.677 qualifies as *aptus*, fitted. Examples of these are the odours described in *DRN* IV.678-683, some of which lead each of the different creatures to its own food (*ad sua quemque / pabula ducit*, IV.684-685). Masses of Epicurus' first category will form the odours which compel creatures to leap back from foul poison (*a taetro resilire veneno / cogit*, IV.685-686). These masses are in disorder (τεταραγμένως) and their atomic structure might be comparable to the atomic structure of the eyes of someone who has been blinded after his eyes were struck and penetrated by the fiery *simulacra* of the sun (cp. IV.328: [sc. *simulacra solis*] *feriunt oculos turbantia composituras*) as well as to the atomic structure of the body of a person who has fallen ill with fever (cp. IV.666: *perturbatur ... totum corpus*).

The Lucretian examples in IV.678-683 are taken, without exception, from the animal world³² and they pertain to animals with an exceptionally keen sense of smell. To begin with, two winged species are introduced which are attracted from afar by the smell of their food: bees and vultures (IV.678-680):

... ideoque per auras
mellis apes quamvis longe ducuntur odore,
vulturisque cadaveribus ...

These lines are an example of the Lucretian practice to contrast tiny, little things or creatures with big and huge ones.³³ Further, in line 679 the large distance between the bees and the smell attracting them is formally reflected by the distance between the words *apes* and *odore*.

Immediately hereafter Lucretius refers, in a manner revealing his talent as a didactic poet, to animals which have a keen sense of smell which is of use to man: dogs and geese (IV.680-683):

... tum fissa ferarum
ungula quo tulerit gressum promissa canum vis
ducit, et humanum longe praesentit odorem
Romulidarum arcis servator candidus anser.

If one wonders why this passage does not incorporate a reference to the human sense of smell, an answer may be found in olfactory expositions written by Aristotle, Ps.Aristotle and Theophrastus: the human sense of smell is weak and worse than that of most animals, see e.g.:

- Arist. *Sens.* IV.440b31-441a2: ...χειρίστην ἔχομεν τῶν ἄλλων ζῴων τὴν ὄσφρησιν καὶ τῶν ἐν ἡμῖν αὐτοῖς αἰσθήσεων (also *de An.* 421a9-10; *HA* 494b),
- Ps. Aristot. *Probl.* 962b: [sc. man] ἥκιστα ὄσφραντικὸν τῶν ζῴων,

³¹ Cp. the use of σύμμετρα in Pla. *Tim.* 67c7 (where it is stated that (the particles of) the flame of colour are commensurate with those of the fire of vision): ὄψει σύμμετρα μόρια ἔχουσα πρὸς αἴσθησιν.

³² For Lucretius' use of examples pertaining to animal world, cp. Schrijvers in this volume 151-161.

³³ For this Lucretian procedure, cp. Schrijvers (1977).

– Thphr. *CP* VI.5.2: ...χειρίστην ἔχοντας πάντων τὴν ὄσφρησιν ... πολλαὶ λανθάνοιεν ἂν ἡμᾶς ὀσμαιί (also *CP* VI.5.6; VI.17.10; *Od.* 4).³⁴

Moreover it is striking that, whereas the sophisticated noses of bees, dogs and vultures are evidently stock examples in ancient literature,³⁵ to my knowledge, in only one other ancient text the goose is qualified as an animal with a keen sense of smell: Serv. *Comm. in Verg. Aen.* VIII.652. Here Servius concludes his narration of how the geese saved the Capitol from falling into the hands of the Gauls with the following elucidation:

(tunc Manlius ... Gallos detrusit ex arce, clangore anseris excitatus, quem privatus quidam dono Iunoni dederat) namque secundum Plinium nullum animal ita odorem hominis sentit.

If one tries to find out if Lucretius' example could have been based on reading knowledge, Servius' reference to Pliny is not very helpful: if it had been possible to retrace it, the supposition that Pliny's information came (ultimately) from Aristotle's or Theophrastus' ornithological studies,³⁶ would have provided us with a possible (direct or indirect) source of *DRN* IV.682-683, but no references to geese having a keen sense of smell are found in the 37 books of Pliny's *Naturalis historia*. So Servius' attribution seems to be mistaken and, as it appears from a number of paraphrases and citations from *DRN*³⁷ that Servius was well acquainted with Lucretius' poem, it is not implausible that his information goes back to *DRN* IV.682-683.

Besides, in one of the more detailed versions of the story of the geese, Livius V.47.3,³⁸ it is, at the most, suggested that these birds *heard* the Gauls:

[sc. the Gauls] tanto silentio in summum [of the arx Capitolina] evasere, ut non custodes solum fallerent, sed ne canes quidem, sollicitum animal ad nocturnos strepitus, excitarent. Anseres non fefellerent quibus sacris Iunonis in summa inopia cibi tamen abstinebatur. Quae res saluti fuit: namque clangore eorum alarumque crepitu excitus M. Manlius.

If, to finish this argument, one takes into consideration that, to my knowledge, the vulture is the only other extant ancient example of a bird with a keen sense of smell,³⁹ it seems not improbable that Lucretius slightly tampered with the famous geese story and

³⁴ The opinion of Diogenes of Apollonia is more moderated, cf. the report in Thphr. *Sens.* 41: ... ἐνια τῶν ζῴων ὀσφραντικώτερα τῶν ἀνθρώπων εἶναι.

³⁵ For bees, see e.g.: Aristot. *HA* 534b18-25 (Col. IX.15,10 instructs the bee-keeper carefully to seal the room in which he drains the honey from the comb; otherwise the bees will find their way to it), vultures, e.g.: Plin. *Nat.* X.191; Apul. *Apol.* 57, bees and vultures: Plut. *Qaest. Conv.* 918c, dogs, e.g.: Empedocl. DK 31 B 101; Erasistratus and his followers *An. Lond.* 33.15-17; Sext. Emp. *PH* I.64; D.L. IX.80; Cic. *N.D.* II.151; Verg. *A.* IV.132; Sen. *Phaed.* 40; Col. VII.12.7; Apul. *Apol.* 57.

³⁶ Cp. e.g. Pliny's lists in *Nat.* I of the non-Roman sources he used in writing books XXVIII-XXXII (the books on animals).

³⁷ e.g. in the first six books of Servius' *Commentary* 9 citations and 12 paraphrases (including references to all the books of *DRN*) are found.

³⁸ Further references to the story of the geese, but providing no answers to the question with which sense the geese first perceived the Gauls: Cic. *Q. Rosc.* 20.65; Verg. *A.* VIII.655-656; Ov. *Met.* II.538; XI.598-599; Plin. *Nat.* X.26.51, XXIX.14.52; Ael. *NA* III.52.

³⁹ In Philop. *In de an.* II.9: ... τῶν πτηνῶν καὶ πεζῶν πολλὰ πόρρωθεν τῶν ὀσμῶν ἀντιλαμβάνονται διὰ τὴν δίοσμον τοῦ ἀέρος δύναμιν (391,3-5 Hayduck), τῶν πτηνῶν probably refers to vultures, see the foregoing section: πολλὰ ... τῶν ἐνύδρων ὀσφραίνεται καὶ πόρρωθεν τῆ ὀσμῆ ἐπὶ τὸ δέλεαρ ἀπαντᾷ, ὥσπερ καὶ τῶν πτηνῶν πολλὰ, οἷον γῦπες· ἐκ πολλῶν γὰρ διαστημάτων τῆς ὀσμῆς τῶν νεκρῶν σωμάτων ἀντιλαμβάνονται (390,32-33-391,1 Hayduck).

introduced this adapted version in order to pepper his olfactory treatment with a typical Roman flavour.⁴⁰

The main topic of the second section (one smell is more fitted to some creatures and another to others) belongs to the arsenal of phenomena with which philosophers of a sceptic signature bombarded the epistemological theories of the dogmatic philosophers (cp. S.E. *PH* I.51, 101).⁴¹ However, one should suspend the conclusion that Lucretius is reacting to ‘the Sceptics’ here, for, as appears from the following citations which contain, for example, instances of odours that are bad, unsuited or even injurious to some living beings, but innocuous or even fragrant to others, the relative effect of odours was also a topic of Peripatetic accounts on biology, cp. e.g.:

- Thphr. *CP* VI.5.1: ἄλλαι [sc. odours] ... ἄλλοις [sc. animals] ἐναντία καὶ οὐ πρόσφοροι, καὶ οὐ μόνον εἰς τὸ μὴ δεῖσθαι, μηδὲ ζητεῖν, ἀλλ’ ὑπὸ τῶν ἡδίστων ἡμῖν ἀναιρεῖσθαι, καθάπερ οἱ γῦπες ὑπὸ τῶν μύρων, καὶ οἱ κύνθαιοι ὑπὸ τῶν ρόδων· πολεμοῦσι δὲ δὴ σφόδρα καὶ αἱ μέλιτται τοῖς μεμυρισμένοις (see also, e.g., *id. Od.* 4; Ps.Aristot. *Mir.* CXLVII.845a35-b2; Plin. *Nat.* X.279; Plut. *Mor.* 87e, 710e; Ael. *NA* III.7, IV.18 and *DRN* VI.973-975: *denique amaracinum fugitat sus et timet omne / unguentum; nam saetigeris subus acre venenumst, / quod nos interdum tamquam recreare videtur*),
- *id. CP* VI.5.3: ... τὰ ἔντομα πάντα ὑπὸ τοῦ ἐλαίου βαρύνεται, φεύγει γὰρ αὐτὴν τὴν ὁσμὴν· ἕτερα δ’ ὕφ’ ἐτέρας τινὸς ἴσως,
- Arist. *HA* IX.612a12-15 (cp. also Ps.Arist. *Pr.* XIII.907b35-37; Thphr. *CP* VI.5.2, VI.17.9; Plin. *Nat.* VIII.62; Plu. *De soll. animal.* XXIV.976d; Ael. *NA* V.10 and for further references Einarson/Link (1990, 252-253)): the panther has no fragrance to man,
- Thphr. *CP* VI.5.5: οὐ ... πᾶσι (sc. ἀνθρώποις) αἱ αὐταὶ (sc. ὁσμαὶ) προσφιλεῖς*, ἀλλὰ μᾶλλον ἐν ταῖς κακώδεσι καὶ βαρεῖαις, ὧν ἔνιαί γε κοινὰ πᾶσιν, οἷον αἱ ἕκ τινων ἐκπνέουσαι χασμάτων καὶ ἄντρων, θανατηφόροι τοῖς προσπελάζουσιν.** εἰ δ’ ἄρα καὶ αὐταὶ τοῖς ἀναπνευστικοῖς μόνοις, ἀλλὰ τοῦτό γε φανερόν ... ὅτι τὸ εὐῶδες τὸ μὴ κατὰ τροφήν ὀλιγοῖς ἢ οὐδενὶ προσφιλές· εἰ δὲ δὴ τι καὶ συμφέρον, ἀδηλότερόν ἐστιν (*cp. *DRN* VI.791-793, 794-796, 802-803, 804-805; **cp. *DRN* VI.808-815),
- *id. CP* VI.17.11: ... τὸ ἡμῖν κακῶδες καὶ ἄοσμον ἐκείνοις (sc. animals) εὖοσμον.

3. *DRN* IV.687-705

Lucretius closes his account of smell with the following section:

Hic odor ipse igitur, naris quicumque lacessit,
est alio ut possit permitti longius alter,

⁴⁰ According to modern studies on sense perception, birds generally do not have very keen noses, cf. e.g. Lilja (1972) 160; Vroon & van Amerongen & de Vries (1994) 27; Ackerman (1991) 30: ‘most birds don’t have very sophisticated noses, although there are some exceptions — New World vultures locate carrion by smell, and seabirds often navigate by smell. But the animals with the keenest sense of smell tend to walk on all fours, their heads hanging close to the ground, where the damp, heavy, fragrant molecules of odor lie.’

⁴¹ On Lucretius and the Sceptics, see Schrijvers (1992) and Lévy (in this volume, 115-124).

690 sed tamen haud quisquam tam longe fertur eorum
quam sonitus, quam vox, mitto iam dicere quam res
quae feriunt oculorum acies visumque lacessunt.
errabundus enim tarde venit ac perit ante,
paulatim facilis distractus in aeris auras,
695 ex alto primum quia vix emittitur ex re
(nam penitus fluere atque recedere rebus odores
significat quod fracta magis redolere videntur
omnia, quod contrita, quod igni collabefacta),
deinde videre licet maioribus esse creatum
700 principiis quam vox, quoniam per saxa saepta
non penetrat, qua vox volgo sonitusque feruntur.
quare etiam quod olet non tam facile esse videbis
investigare in qua sit regione locatum;
refrigescit enim cunctando plaga per auras,
nec calida ad sensum decurrit⁴² nuntia rerum.
705 errant saepe canes itaque et vestigia quaerunt.

In line 687 Lucretius returns to the explanation of the nature of smells as such and observes that one smell can travel over a longer distance than another (IV.687-688). Apparently the reader is supposed to be acquainted with the phenomenon, for our poet immediately moves on to a related topic (IV.689-691, transl.):

But yet no smell at all is carried as far
as sound, as voice, not to mention the things
which strike the pupil of the eyes and stir vision.

If one stops to wonder which instances of the different range of different smells Lucretius and his ancient readers, by means of personal observation or/and reading knowledge, might have been acquainted with, an answer is provided by the opening question of ch. 12 of Theophrastus' treatment *On Smells*:

(ἔχει δ' ἀπόρησιν καὶ τόδε.) δι' ὅτι τὰ μὲν ἄνθη καὶ τὰ στεφανώματα ἀσθενέστερα ὄντα ταῖς ὀσμαῖς καὶ πόρρωθεν ὄζει, ἢ δ' ἴρις καὶ τὸ νάρδον καὶ τὰ ἄλλα τὰ εὖοσμα τῶν ξηρῶν ἰσχυρότερα ἐγγύθεν;

Transl.: why do coronary plants,⁴³ the odour of which is weaker, smell from afar, whereas iris-root, nard and the other fragrant dry things, the odour of which is stronger, smell from nearby?

The explanation of the phenomenon that smells travel not so far as sounds and voices and definitely not so far as *simulacra*,⁴⁴ is given in IV.692-700. To begin with, it is stated that a smell, in losing its way, comes slowly and perishes before (*ante*: before it reaches the olfactory organ),⁴⁵ as it is little by little, but easily, dispersed into the breezes of the air (*paulatim facilis*⁴⁶ *distractus in aeris auras*, IV.692-693).

⁴² *decurrunt* OQ, *decurrit* Lambinus (accepted by Giussani, Godwin, Rouse & Smith. The textual corruption may come from the following word *nuntia*).

⁴³ Some instances of coronary plants are given in Theophr. *CP* VI.14.7: ...στεφανωμάτων (οἶον ἐρπύλλου [tufted thyme] σισυμβρίου [bergamot mint] καὶ ἐπὶ τῶν ἄλλων), for more details, cp. *id. HPI*. VI.6-8.

⁴⁴ *Simulacra* also move faster than the auditory particles, cp. VI. 164-172: lightning is seen before thunder is heard: *quia* [sc. *eae res quae auris moveant*] *semper ad auris / tardius adveniunt quam visum quae moveant res*.

⁴⁵ Cp. Rouse & Smith (1982², 302), with reference to Pius: '*evanescit antequam perveniat ad nares*' and Leonard & Smith (1942, 585).

⁴⁶ For the predicative use of *facilis*, cp. the use of *largus* in IV.894: [sc. *aer*] *penetratque foramina largus*.

In the following lines (IV.694-700) two reasons are given for this slow and straying movement of smells as well as their early dispersion:

1. smells, coming from deep down inside things (*ex alto*),⁴⁷ are emitted from their source with difficulty (*vix emittitur ex re*, IV.694),
2. smells are composed of larger first beginnings (*principia maiora*) than voices (IV.698-699, and, by implication, of much larger *principia* than the *simulacra* consist of, cp. IV.110-122 on the extreme fineness and smallness of the *simulacra*). (Probably, this relatively large size of the olfactory particles is also a factor that determines their difficult emission.)

As to the first reason, the paraphrase given above departs from the one's given by Bailey (1947, 1262) and Godwin (1986, 133). These commentators only refer to the coming from deep within things: however, the addition of difficult emission (of large *principia*) is essential, for, as can be inferred from IV.199-203, where it is stated that the sun's light and heat, which consist of minute particles that are sent forth from the depth of the sun, glide and diffuse themselves through the whole world *extremely rapidly*, provenance from the depth as such is not a sufficient explanation for slow motion and early dissipation.

The second reason appeals to knowledge the reader might have gained from IV.183-184 and 343-344: objects composed of minute particles are rapid (and powerful).

As to both reasons, Lucretius provides us with further information. The second one is elucidated by the statement that smell does not penetrate stone walls, whereas voice and sound commonly pass through them (IV.699-700).⁴⁸ The first one is adstruced with the following statement (IV.695-697, transl.):

for the fact that all things appear to smell more when broken (*fracta*),
when pounded (*contrita*), when loosened in fire (*igni collabefacta*),
is evidence that smells flow and move away from deep within things.

On the basis of one's own experiences as well as with reference to the information incorporated in Thphr. *Od.* 13, 40; *CP* VI.17.3; Xen. *Cyn.* 5.5 (e.g. not everything smells stronger when heated, some odours are even spoiled or removed under the influence of sunlight and heat), one might say that the expression 'all things' (*omnia* IV.697), is simply a rhetorical overstatement, coming down to: some specific things. (The explanation given in TLL s.v. *collabefio*: '*omnia* sc. *vasa*', is totally ungrounded.)

The quintessence of the triplet *fracta* (broken), *contrita* (pounded), *igni collabefacta* (loosened in fire) must be that some things smell more when they have been *dissolved* in certain specific ways.⁴⁹ Leonard & Smith and Bailey, the only commentators paying some attention to the reference of this part of Lucretius' argumentation, relate the term *contrita* respectively to the crushing of objects in a mortar and the preparation of drugs. If we consult the ancient sources concerning the question which

⁴⁷ Cp. IV.92 (on smells, smoke and heat): *ex alto ... veniunt intrinsecus ortae*.

⁴⁸ The first half of this statement is contradicted in VI.952: (... *per dissaepia domorum saxea voces / pervolitant*), *permaneat odor ...*

⁴⁹ cf. TLL ss. vv. *frango* (col. 1241,7-1244,18), *contero* (col. 682,62-68), *collabefio* (col. 1572,32-35).

concrete instances Lucretius might have had in mind here, we are provided with the following information:

- *fracta*: an example might be the breaking by chewing of vegetables and dried vegetal products, cp. Theophr. *CP* VI.9.3: (ἡ δὲ τῆ γεύσει τῶν ὀσμῶν αἴσθησις οὐκ ἄλογος, ἥπερ μάλιστα ἐνδηλος ἐπὶ τῶν εὐστόμων λεγομένων τῶν τε λαχανηρῶν (ὥσπερ ἀνήθου μαράθου μυρρίδος, ἐνίων δ' οὐδ' ἐχόντων ὄλων ὀσμήν) καὶ ἔτι μᾶλλον ἐπὶ τῶν ξηρῶν, ἀόσμων δὲ τελέως (οἶον φακοῦ κνήκου τῶν τοιούτων)): διαθρανόμενα γὰρ ἅμα τῆ μασήσει καὶ διαθερμαινόμενα ποιεῖ τινα ἀτμόν,⁵⁰ ὃς ἀναπέμπεται λεπτὸς ὢν διὰ τῶν πορῶν εἰς τὴν ὄσφρησιν, as well as the fact that *frangere* is used to refer to the grinding of, for example, grain by the teeth, cp. TLL and OLD s.V. *frango* (I.1; 3b) and e.g. Sen. *Ep.* 90.22, 23; Plin. *Nat.* XVII.62, XVIII.195.
- *contrita* might refer to (a) the pounding of plants as well as (b) the rubbing of (fossil) stones, cp. (a) Plin. *Nat.* book XXII, a book which draws heavily on Theophrastus' botanical writings,⁵¹ where it is stated that the leaves of the plant *onochilon* (a boraginaceous plant, probably a viper's bugloss), when pounded, give off the smell of cucumber: *folia trita odorem cucumeris reddunt* (*Nat.* XXII.25.51). (b) A rather different example, namely of a stone which emits odour when being rubbed (*trita*) by the hand and subsequently heated, is found in the *Epigrams* of Martial. This Roman poet illustrates the sweet scent of kisses with a reference to pieces of amber (*sucina*) which, when being rubbed, become fragrant by the warmth of the hand (*Mart.* III.65.5, XI.8.6 (cp. *Juv.* VI.573)).
- *igni collabefacta* might refer (a) to the loosening of fragrant, dry things, e.g. frankincense, by burning them, cp. *Thphr. Od.* 12, where it is first stated that some of the fragrant dry things smell when people eat them, whereas others need pounding, τρῖψις, and splitting, διαίρεσις (cp. the references given above). Finally a category of dry things is introduced which need burning (πύρωσις), e.g. myrrh (ἡ σμύρνα), frankincense (ὁ λιβανωτὸς) and all that is to be burnt as incense (πᾶν τὸ θυμιατόν): καὶ ἔνια γε προσενεγκαμένοις, ἔνια δὲ καὶ τρίψεως προσδεῖται καὶ διαιρέσεως, τὰ δὲ καὶ πυρώσεως, ὥσπερ ἡ σμύρνα καὶ ὁ λιβανωτὸς καὶ πᾶν τὸ θυμιατόν. This burning serves to open up (ἀνοιξις) the pores of the dried things under consideration, cp. *Od.* 13. (Note that the second and third category in *Od.* 12 are equivalent to the second and third category in *DRN* IV.697. This might indicate that Theophrastus' exposition in one way or another influenced Lucretius' argumentation.)
(b) Another candidate might be the boiling of flowers and plants, undertaken in the preparation of sweet scented ointments and perfumes, cp. *DRN* II.847-853: in the preparing of (transl.) 'the balmy tincture of marjoram and of myrrh, and the flower of spikenard which breathes nectar to the nostrils',⁵² the odours are mixed and boiled together (*concoctos*, II.853) with (almost scentless) olive oil.

⁵⁰ For an explanation of smells in terms of vapours, cp. *Pla. Tim.* 66d-67a (see 164 above).

⁵¹ Cp. the relevant list of non-Roman sources given in *Nat.* I.

⁵² Transl. of II.847-848 by Rouse & Smith.

In the last lines of Lucretius' olfactory account it is stated that (IV.701-702, transl.):

because of this [sc. the straying, *errare*, of the odour-constituting particles] ...
it is not easy to trace out in what part the scenting object is situated.

This claim is elucidated in a poetical statement (IV.703-704, transl.):

for the blow (*plaga*) grows cold as it is moving hesitantly through the breezes
nor does it run hot to the sense with news of the objects.

Here *plaga* is used as a *effectus pro efficiente*: the result, the coming into contact with the nostrils of the emitted particles, instead of the *efficientes* of the *plaga*, the moving particles themselves, cp. IV.356-357: *perit / eius* [sc. of every angle of a square tower] *plaga*: the vanishing of the blow imparted to the eyes by the *simulacra*, instead of the vanishing of the angles of the moving *simulacra* themselves.⁵³

In IV.703-704 Lucretius describes the fading of odours metaphorically as 'growing cold', *refrigescit*, and 'not running hot', *nec calida decurrit*. Maybe this warm/cold terminology has been influenced by the phenomenon that cold can have a dulling and obliterating effect on odours, whereas warmth generally stimulates them, cp. e.g.:

- Aristot. *Sens.* V.443b14-16: ... τὸ ψυχρὸν καὶ ἡ πῆξις καὶ τοὺς χυμοὺς ἀμβλύνει καὶ τὰς ὀσμάς ἀφανίζει· τὸ γὰρ θερμὸν τὸ κινεῖν καὶ δημιουργοῦν ἀφανίζουσιν ἡ ψῦξις καὶ ἡ πῆξις (cp. also Ps.Aristot. *Pr.* 12.6; Thphr. *CP* VI.17.5; *Od.* 40; Xen. *Cyn.* 5.1-2),
- Plut. *Qaest. Conv.* 918b [of tracks]: ... κινεῖ δὲ λυόμενα καὶ χαλόμενα μαλακῶς ὑπὸ θερμότητος, ἡ δ' ἄγαν περίψυξις πηγνύουσα τὰς ὀσμάς οὐκ ἔᾶ ῥεῖν οὐδὲ κινεῖν τὴν αἴσθησιν (ᾔθεν καὶ τὰ μύρα καὶ τὸν οἶνον ἤττον ὄζειν ψύχους καὶ χειμῶνος λέγουσιν· ὁ γὰρ ἀῆρ πηγνυμένας ἴστησι τὰς ὀσμάς ἐν αὐτῷ καὶ οὐκ ἔᾶ ἀναδίδοσθαι).

The Lucretian account of odours is rounded off with a toning down of the earlier claim that dogs (IV.680-682, transl.) 'lead us to wherever the cloven hoof of wild beasts has brought its track':

'and so dogs often go off course and search for tracks.' (IV.705).

This procedure is comparable to:

- a. IV.362-363, where at the end of the pericope the earlier statement that every angle of a square tower is seen as round from far off (IV.353-355), is qualified on the following lines:

non tamen ut coram quae sunt vereque rutunda,
sed quasi adumbratim paulum simulata videntur

- b. IV.612-614, where the explanation of the phenomenon that voices can pass through places through which the eyes cannot see (IV.595-614), is rounded off as follows:

et tamen ipsa quoque haec, dum transit clausa domorum,
vox obtunditur atque auris confusa penetrat
et sonitum potius quam verba audire videmur.

⁵³ On the Epicurean use of *πληγή/plaga*, cp. Koenen (1995) 186-187.

4. Concluding remark

With the references to e.g. non-atomistic Pre-socratics, Plato, Aristotle, Theophrastus and the Stoics given above, I do not want to suggest that Lucretius actually used their explanations as 'heterodox' sources or that he directly reacted to the concepts and theories discussed by these philosophers. For such conclusions the evidence is obviously lacking. In my view, the relevant non-Epicurean passages helped us to solve some of the problems and questions raised by the content of the olfactory passage under discussion and to shed some light on those lines and clauses which are left in the dark by the commentators on *De rerum natura* IV.673-715.*

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