

1) Perceiving contagion.

Thucydides and the plague of Athens: failure of doctors; those attending the sick likely to catch the disease. Not an original observation, or signalled as such. Galen on the failings of Thucydides: a wonderful account, but no Hippocrates. Isocrates, Aegineticus: the horrors of living with *phthisis*/tuberculosis. Animals. Gardens. Diseases of propinquity commonly noted and dangers understood.

2) Lexical dilemmas.

Greeks share, Latin touch (*contagio/contactus*) or infect, a metaphor from dying. Metaphor of touch is not confined to medicine: politics (Bacchanal conspiracy); morals (St. Cyprian orders immoral virgins to be separated from other women like infected sheep or sick cows); religion, especially heresy. Greek terms? *Epaphe* = leprosy in legal papyri? *Synapsis/synanachrosis* in Plutarch, perhaps from Epicurean, Methodist sources. Galen "seed of disease" in *De causis procatarticsis*, *De febrium differentiis*, *Comm. in Epid.*. Absence of words does not mean absence of the phenomena or absence of understanding.

3) Medical problems.

Are there new diseases? *Elephantiasis* (leprosy?) in 2nd century B.C.; *mentagra*/lichen under Emperor Claudius. Plutarch in *Symposiaca* raises question: positive answers blame either new lifestyle or an external cause (climate or emanations from outside).

What is transmitted and how? Some skin conditions, dandruff, psora pass of skin; *ophthalmia*, *lippitudo* depends of the receptivity of the eye, cf. the Evil Eye; more deadly epidemic disease requires some poison/putrefaction that can penetrate the body. Air is standard medium: Nature of Man says polluted by an apocrisis. Combination of bad air and receptivity. Herodian blames epidemic disease in army in Mesopotamia on bad air (too hot and dry) on diet, and on the troops from Germany not being habituated. Galenic/Hippocratic tradition focuses on air (see fragments of commentary on airs, waters and places in Oribasius) which creates changes in the body's humours, which result in symptoms of pestilential disease. Disease is not a specific entity but a group of identical symptoms arising from similar humoral imbalances. Treatment either to change the air (Hippocratic legend of the plague), reduce intake of air, preventive diet; seclusion (Caelius Aurelianus, scapegoat/pharmakon), killing of infected animals.

4) Theological novelties.

Divine judgement of plague on sinners (Cyprian); to flee or not to flee? Denial of contagion in Koran and Hadith. Objections to something obvious by non-theologians: Allah as responsible. Keep away from infected areas, and possibility of flight. Doesn't stop discussions of causation or distinction by Razes of smallpox and measles.

Loving your leper. Stories of leprosy in New Testament give prominence to this condition. But until 13th century or later, *leprosaria* are not places of segregation: disease seen as a humoral condition. Arrival of Black Death strengthens fears of contagion, leading to new legislation against lepers.

5) The Black Death.

The Black Death, *peste grande*, *la grande mortalità*, of 1346-50, and subsequent recurrences presented new problems for university doctors. Model found in Avicenna and Galen: bad air, general and local (contagion). Some early plague texts and many later mention contagion, not seen as incompatible with theory of air and humoral susceptibility. Hot, sticky air most dangerous to those already hot and sticky. Some doctors uncertain of action, but by 1380 regain confidence, through experience and successful survival of patients. God - planets - air - individual (- contagion - air) - humoral changes - disease. Action could be taken by different groups at different points in the process: prayer - forecasting - cleaning the air/flight (*cito, longe, tarde*) - strengthening humours (banning contact, quarantine, lazaretti) - bleeding, humoral remedies. Many doctors already accept notions of contagion by direct contact, at a distance, and by intermediaries, e.g. cloth, but talk in terms of vapours and odours.

Italian cities create temporary health boards, later permanent, growth of civic involvement, and of growing administrative preference for contagion-passes, information networks, segregation in a disease of the poor. Pattern extend to other epidemic contagions.

6) Renaissance epidemics.

English sweat 1482-1551; Syphilis: further plague outbreaks: petechial fever; *lues Morava*; *lues Hungarica*; *scherbock* (land scurvy). New diseases? Or earlier diseases known to or neglected by the Greeks (debates in Ferrara 1495, Leipzig and elsewhere)?

7) Fracastoro.

1483-1554; *Syphilis* begun ca. 1510, publ. 1530; *De morbis contagiosis*, begun by 1534, ready 1538, revised publ. 1546.

Admirer of antiquity, especially Lucretius, but less a Greek scholar than Da Monte (1498-1552). Claims that ancients had failed to appreciate contagion. Syphilis is a universal disease, caused by atmospheric changes, affecting Europe and America; existed earlier in America but not brought back by Columbus. Spread by *semina morbi*, seeds of disease, that can invade, creep into suitable parts of the body, and create putrefaction. This idea developed in *De morbis contagiosis*: changes in atmosphere break down air into little putrescent particles that form seeds of specific diseases: these are attracted by sympathy to appropriate areas of individual bodies, like iron to a magnet, and to no other; once there they putrefy and grow into a disease.

No part of this theory is entirely new: but the combination is. Tripartite division into direct, at a distance, and by intermediary is very common in writers after the Black Death and becomes still more common. F. takes standard views on air, and contagion, especially in plague, as involving putrefaction and, as in Aristotelian Problems, the transfer of something from *a* to *b*. Strongest attack is by Da Monte in lectures at Padua in 1540s, insisting that everything can be explained solely by the degree of putrefaction and the further humoral changes within the body.

8) Between Scylla and Charybdis.

F. has to negotiate two criticisms: "seeds", emanations, and a liking of Lucretius run the risk of Epicurean heresy, and F. is a devoted churchman in Verona, and at Council of Trent; secondly, the question of specificity. Aristotelian cause and effect has a cause "bad air" working directly on already unbalanced humours to produce disease symptoms, and thus extra layer of seeds unnecessary.

Ficino's (neo-)Platonic universe, a living organism, motivated by sympathy and antipathy. Idea taken up by F.: *De morbis contagiosis* preceded by a treatise on sympathy and antipathy. The species of seed, which is a sort of emanation, has a *vis spiritualis* that recognises parts of the body that are already in sympathy: these may be particular organs (eye in *ophthalmia*, penis in Syphilis), or particular individuals (plague), but are not dependent of existing humoral imbalance. Notion already used by Ficino in *De peste*, and, in France, by Fernel in his Paris lectures, and later in his *De peste*. It is not heretical because it presupposes an "Aristotelian/Platonic universe of causation".

Fernel (and may others) see plague as a poison, acting by an "occult", i.e. unknown, quality of its total substance, and having a variety of effects on the humours, depending on their already existing balance. So what in one person could be plague, could be pestilential fever in another. Fracastoro identifies the poison with a seed of disease, with the poisonous putrefaction a quality of the entity. Fernel, Da Monte insist that the disease develops qua disease only when the putrefaction/poison/occult cause reaches the humours, and that both catching a disease and the development of the disease into syphilis or plague are depending on imbalances of humours that can be rectified in advance by doctors. For Fracastoro infection does not depend on a pre-existing humoral imbalance (although it might), but on the sympathy that links the seed with its appropriate food: *seminarium/pabulum* are agricultural metaphors. That sympathy is unpredictable, hence Fracastoro says nothing about prevention or forecasting. The nature of the seed determines the nature of the disease: it is a live seed, capable of generation, but not *contagium vivum* in quite the sense of a bacillus, and insect, or a germ. This is where Fracastoro parts company with fellow Galenists.

9) Many follow but few understand.

Fracastoro's views are widely known to his contemporaries, although few bother to refute them. Those who praise him, like Mercuriale, dispute his ideas on specific diseases and continue much as before. Paulmier, 1578, only other 16th cent. author on contagious diseases, follows his master Fernel, and names four diseases: rabies, syphilis, pestilential fever, and elephantiasis. His seeds of disease are an alternative name for "inquinamenta", excretions, putrefaction that constitute bad air. Officials of Health Boards supporting quarantine and segregation have no need of his support. New notions of specific diseases not until Leeuwenhoek and the microscope, and, still more, the Pasteurian revolution of the 19th, when Fracastoro became the father of bacteriology, a curious fate for a believer in a universe governed by sympathy and antipathy.