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Chlorosis – the 'green sickness'

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SYNOPSIS The literature of the nineteenth century often referred to chlorosis. Some examples, taken from French sources, are mentioned. The illness was only given its name at the beginning of the seventeenth century, but the clinical picture of *febris alba virginum* had been known for a long time previously. The history of chlorosis is interesting because of the variety of explanations, including the psychological, it attracted before it came to be recognized as due to hypochromic anaemia or iron deficiency.

CLASSICAL DOCTRINE

The word 'chlorosis' itself is not old. According to available information, it was first proposed by Jean Varandal (Varandaeus) of Montpellier in his *De morbis et affectibus mulierum* (Lyon, 1615, I, I). But, like many of his medical contemporaries, he was only creating a new learned word to designate a clinical picture that had already been recorded.

When he invented this term, Varandal drew upon Hippocrates. The following quotation is taken from the second book of *Prorrhetic* (p. 31), from a passage that deals in turn with 'bad complexions' (*chromata ponera*), 'greenish complexions' (*chlora chromata*) and 'jaundices' (*ikteroi*):

There are those who, while still young, have a persistently bad colour which is not, however, icteric in character: such individuals, male and female, suffer from headache, eat stones or earth, and have haemorrhoids. A greenish complexion, in the absence of serious signs of jaundice, is accompanied by the same symptoms, though instead of eating stones or earth the patients suffer more than those already mentioned from hypochondria.[1]†

This picture, which associates changes in complexion with perversions of appetite, covers only part of the symptoms included in the new disease: but it was again from Hippocrates that the additional elements were borrowed. In *The Diseases of Girls* we find a formidable recital of the disorders which await young girls whose menstruation is hampered by enforced continence: the text begins by invoking 'the intense terrors which human beings experience when they lose their minds and think they see hostile demons':

Many people are unable to breathe after seeing such visions, more women being affected than men: for the natural disposition of women is less courageous and less resolute. Young girls who do not marry when they reach the age of marriage are particularly susceptible when they begin menstruating, never having previously been exposed to the symptoms they now experience. For at that moment the blood flows to the womb as if in readiness to leave the body. If the orifice is not open and blood reaches the womb in great quantities, both from nutriments and from growth processes, and has no means of leaving the womb, then it rushes in its abundance to the heart and the diaphragm. When these are full, the heart becomes torpid; the torpor is followed by numbness and numbness by delirium . . . Fever and ague ensue; such fevers are termed erratic. In this state a woman experiences violent emotions because of the acute inflammation; she is ready to kill because of the putridity; and she has fears and terrors because of the dark and gloom, and a choking feeling because of pressure around the heart. Her intimate being (*thumos*) is troubled and in the anguish caused by the perversion of the blood, this in its turn becomes perverted. The patient says terrible things (*heteron kai phobera*). Visions command her to jump from heights, to throw herself into wells, to strangle herself, all of which seem to her good and useful acts. When there are no visions, there is a certain pleasurable feeling which makes death seem good and desirable. I advise young girls who experience such symptoms to marry as soon as possible: in fact when they become pregnant they are cured . . . Among married women those who are sterile are most susceptible.[2]

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† Notes will be found on pages 466–468.

If we combine the two Hippocratic texts we obtain an almost complete description of Johann Lange's *morbus virgineus*,[3] of Mercato's *febris alba*,[4] of Ambroise Paré's *palles couleurs*[5] and of Varandal's *chlorosis*.[6] Paré's description emphasizes a two-fold process that governs the disease: mechanical obstruction, and a qualitative change in the blood which is passed on to the heart. The model used to explain the malady is one of blockage and compression, coupled with a 'corruption' which is equivalent to a mortifying putrefaction occurring *in vivo*:

> And when they (the girls) are mature and ready for marriage, if menstruation begins but marriage is too long delayed, we find always that they are tormented grievously by a swooning of the heart and suffocation of the womb, particularly if they fall in love; their genitals feel warm, which arouses their desires and titillates and stimulates them, causing them to expel their own seed themselves. The seed, if it remains in the spermatic vessels or in the womb, rots and turns to poison (as we have said), causing putrid vapours to rise to the higher parts and to pass into the blood, altering it and causing the patients to have palpitations and swooning of the heart, to groan and sigh in an attempt to expel this superfluous and corrupt seed; they feel pensive and sad, and lose all appetite, their depraved appetite being called pica; they cannot sleep; their complexion is pale and yellowish, as if burnt by the sun, and puffy, like the whole of their body, so that they seem more dead than alive and often die dropsical and languishing, or mad.[7]

What is the cure? That recommended by Hippocrates: marriage. And Paré adds that 'country girls' do not suffer from these symptoms, or only rarely, since 'fresh air and the hard work which they perform uses up and destroys corrupt and poisonous spermatic matter both by ordinary sweating and by inconspicuous transpiration'. This retention of 'seed' is hard to distinguish from the retention of 'menstrual discharge' which is responsible for nausea and vomiting (ch. LXXV), for 'shivering and rigors' (ch. LXXVII), for 'reveries' (ch. LXXVIII) and for 'swooning' (ch. LXXIX). A humoral explanation accounts for this accumulation of psychic symptoms: 'the menstrual blood contains much that is of melancholic humour and easily turns to same' (ch. LXXIV).

Varandal had not much to add, except that he envisaged an additional series of 'immediate' causes, arising from the unfavourable influence or effect of one or other of 'six non-naturals': climate, food, exercise, sleep and waking, mental perturbation, excretions. The following extract is translated from his Latin text:

> If there is a malady which is peculiar to the feminine temperament, which is more humid and more cold than the masculine temperament, it is that which we find developing almost endemically in the female sex, particular in beautiful young girls of noble birth who live in a state of total abstinence from all sexual contact. They are usually characterized by a *pale complexion*, *white icterus*, and *lovesick feverishness*, by a *virginal malady* which following Hippocrates we call chlorosis. It is a form of cachexia, accompanied by an abnormal colouring of the skin, particularly the face. This malady is often erroneously described in maxims such as the following:
>
> Palleat omnis amans, color hic est aptus amori.[8]
>
> Convinced of the truth of this maxim that love is synonymous with pallor, young girls and weak unmarried women try by every artificial means to make themselves more pale, in order that they may seem more beautiful. One may however, say that the malady results from a combination of causes: air, food and other external causes have made it a more significant one than it used to be in former times.[9]

A new idea has been introduced here: girls make themselves ill in order to achieve an attractive pallor. If they die in consequence, it is often their own fault. Montaigne had already said this, in chapter XIV (XL in Florio's translation) of the first book of his *Essais*:

> I have seene some swallow gravell, ashes, coales, dust, tallow, candles, and for the-nonce, labor and toyle themselves to spoile their stomacke, only to get a pale-bleake colour ... Whereby they sometimes worke their own death.[10]

Whether like Paré we look for an explicit sexual cause ('expelling' their seed alone and 'corruptly') or a vascular cause (obstruction of the uterine vessels leading to morbid swelling of the gastric, hepatic and splenetic vessels), or whether we prefer, like Varandal, an aetiology that incriminates climate, food and the patient's way of life, chlorosis is still a female malady and its chief symptoms are pallor and suppression of menstruation. The 'classical' clinical picture was to be laid down in almost the same form by physicians whose authority remained undisputed for more than a century: Lazare Rivière (who enumerated ten symptoms),[11] and Daniel Sennert.[12] In accordance with the tenets of

humoral medicine, a malady caused by an obstruction of evacuation should be treated with evacuants. Hence the purgatives, and hence also cauterization of the legs and, above all, bleeding. Any form of cachexia, that is to say 'humoral malfunctioning', was likewise rectified by fortifying medicines and 'tonics': thus Mercato, Varandal and many others recommended the use of iron (filings), *massa chalybis*.[13] In spite of its being hard to assimilate in the form in which it was given in ancient remedies, iron remains the principal form of treatment (administered in bivalent iron preparations) for hypochromic anaemia: it may be added that almost since its first use it has been an adequate remedy which, by a happy chance in which the best kind of 'empiricism' played a part, has been part of a therapeutic armamentarium that has not otherwise been lacking in bizarre and absurd substances.

As far as the popularity of the malady is concerned, let us turn to one of the *Conférences du Bureau d'Adresse*, issued by the Brothers Renaudot. As is their custom, they quote the opinions of several speakers. The first two speakers repeat the generally held view and clearly indicate its Hippocratic origin:

> Since women have usually more psychological weaknesses than men, they are usually more subject also to bodily ailments: these include one which is called love sickness, because it usually occurs in nubile girls, and pale fever... This malady should not be despised as an imaginary one: for it is sometimes so violent that the humours causing it rise to the brain, making the girls mad and violent, and at times even ending in sudden death. For this symptom attacks not only the functioning of a single organ or a single faculty but the entire physical order which it destroys and corrupts, causing a bad state of health in which paleness of the skin often degenerates into what doctors call leucophlegmacy or anasarchia in which the flesh soaks up like a sponge all the watery and excremental humidities and transforms them...
>
> It is such a commonly held opinion that pallor derives from love that those who fight under the banner of love often affect that colour as if it were a livery. It is thus particularly characteristic of young girls, who are more susceptible to this passion, as if nature wished to make their countenance reveal what it otherwise desires so artificially to conceal, to make this mute language convey what their modesty cannot utter.[14]

But this thesis, which interprets pallor as an involuntary confession of amorous desire (much the same interpretation as Freud applied to the symptom of hysteria), was contradicted by the third speaker who saw in it a 'popular error:'

> For although the Poet defining the art of love wishes all lovers to be pale, people grow pale no less from hate than from love and one cannot make a causal connection between a strong emotion and a state of health.[15]

Pursuing his argument this sceptical speaker asked further embarrassing questions. How can an illness which affects little girls 'of seven or eight', women 'after their fiftieth year', and even men, be attributed to love and to the suppression of menstruation? Good questions, which must inspire doubt. But the popular imagination is stubborn and, reinforced by the medical imagination, wanted chlorosis and pallor to constitute a malady of feminine weakness, of imperfect femininity.

Consider, for example, the misogyny expressed by Benaudot who, in his description of perversions of appetite, *pica* or *malacia*, repeats the formulae of Montaigne and Varandal:

> The principal causes which give rise to obstructions in the uterine vessels are: mucous and viscous blood, usually produced by bad food such as the chalk, ashes, limestones, cinders, vinegar, cornstalks and earth which young girls often eat, being falsely persuaded that this will make them more beautiful.[16]

To these 'hunger feasts' we may add the desolate picture painted by Lazare Rivière in his list of the different aspects of 'a harmful way of life':

> These girls drink huge draughts of cold water in the evening and before going to bed, or in the morning before breakfast; others drink vinegar; they avidly eat grass, or green unripe fruits, or snow and even ice: this destroys the warmth of their natural parts and produces a large accumulation of crude excrements. Some sleep at great length; others, being too idle and fond of sewing, spend whole days sitting suffering often from exceeding cold; others take too much or too prolonged exercise, going to a ball immediately after dinner, passing most of the night dancing with their lovers, often having at the same time great worries and various passions which trouble, disturb and destroy the normal digesivet processes, giving rise to much cachexia.[17]

This is another way of saying, in the language of Molière's physician: 'She was too fond of dancing, that is what killed her'. At the end of the eighteenth century doctors were not all hostile to dancing: they even recommended it, as a mental diversion that might take the mind off a 'dangerous' passion and improve a sluggish circulation.[18]

STRANGE REMEDIES

In view of the hypothesis that the malady was caused by narcissistic vanity, or by unavowed (and often unavowable) love, we cannot be surprised at the unconsciously *punitive* aspect of some of the remedies, even when the underlying rationale – the source of the stagnant blood, the forced expulsion of the suppressed flux – seemed to correspond to the most straightforward laws of mechanics and to good medical traditions. Hamilton (quoted by Chambon[19]), applied tourniquets to the thighs until circulation in the legs was stopped and menstruation began; up to the nineteenth century the concept of serous plethora made these patients suitable subjects for bleeding. Reporting on gastritis and applying his favourite procedure (namely the evacuation of blood by bleeding or by leeches) to this disorder, Broussais reached the peak of his 'vampirism'; chlorotic patients were spared neither purgatives nor emetics in an effort to clear the digestive tracts; the curative effects of sudden fright were lauded; and as soon as electricity appeared on the medical scene, it was employed as a possible stimulant of the functioning of an inert organ.[20] In his section on *Chlorosis* in the *Dictionnaire de la conversation* (1834), Dr Labat allows us to add to the list of instruments used in treating the passion of chlorotic patients:

> When amenhorrhoea is complicated by a state of debility and uterine insensitivity it is necessary, in order to give that organ the required degree of energy, to stimulate it electrically or by applying a large number of dry cups to the hypogastrium, the loins, the thighs and the breasts. In a serious case of this kind occurring in a married woman one need not hesitate to use a suction pump acting on the whole neck of the womb. Dr Amussat, the inventor of this ingenious instrument, has obtained very good results with it. One may in these circumstances achieve very good results by applying an electric current to the interior of the uterus. All these methods are aimed at somehow stimulating a torpid organ.[21]

We have deliberately selected those recommendations which testify most to the unconscious sadism that was part of the therapeutic intention. Starting with a naïvely physical pathogenic model, logic dictated the need for an adequate therapeutic procedure: but an irrational element crept in, one which on false premises pursued a good aim by means of unfortunate methods. However, as we have already glimpsed, the therapeutic arsenal also contained other resources that were acceptable and efficacious in a different way. This is not the place for a complete inventory, even to correct the portrait of the authoritative and cruel physician which might so easily and falsely emerge from such a list of the torments derived from a rudimentary mechanistic interpretation of chlorosis. Interpretations of this kind *varied*, even in the classical versions, and we can still learn something from these variations.

A FAILURE OF GROWTH

There was no rapid end to the prejudice which wanted to make chlorosis essentially a failure in sexual maturation, a failure to become a woman, for which there might be many contributory causes: hereditary constitution, diet, passions or worries, too much leisure, too much work, lack of fresh air (which could affect both girls of good birth and girls employed in workshops). To preserve the concept it had also to be kept in line with developing ideas and acceptable explanations.

Thus in the nineteenth century, before the discovery of 'internal secretions', the assertions of the old 'humoralism' – e.g. seed that had become poisonous, corrupt blood, obstruction – were rejected in favour of a more mysterious 'impairment of organic evolution', often governed by hereditary factors. In their *Traité de thérapeutique* Trousseau and Pidoux wrote:

> In women at the time of puberty an apparatus which has given no sign of life for fifteen years suddenly awakens and becomes the centre of new functions, whose vitality is such that it is as if a new being were being added to the existing one, directing and con-

trolling it, until it emerges as a woman. Often this realm of reproductive organs is established with ease and without disturbance, but sometimes the moment is marked by violent perturbations. All the other systems of the body are drained of vitality, the uterus itself languishes and cannot become master of its important prerogatives. Assimilation is bad; the blood, while showing no haemorrhage or deviation in flow, becomes impoverished because of a considerable fall in the number of its globules; it fails to perform any strengthening function; it does not give anything; it does not carry away anything. What it lacks is not quantity, but life itself.[22]

At the end of the century Hutinel, a paediatrician, classified chlorosis aetiologically 'among the congenital defects or among the serious ailments of early years... Congenital defects are almost always the result of ancestral infections or intoxications.' And although he recognizes that in the opinion of most authors 'disturbances of hematopoietic function' constitute the chief pathogenic factor, he himself expresses doubt on this point: 'if we regard chlorosis as a blood disorder we risk belittling the concept, taking account of only one aspect of the very general process which constitutes the disorder'. Also, without entirely approving of it, he does not forget to quote the opinion of Hanot who, using a financial metaphor, looked on chlorosis as 'an inherited inability of the organism as a whole to meet the new costs of feminine puberty. Since the organism could not defray these expenses, Hanot considered that there was a kind of simultaneous bankruptcy of all functions'.[23]

DYSPEPSIA

We have seen that from the end of the seventeenth century the objection had been made that chlorosis affects not only young women but also little girls, menopausal women and even men. It was difficult thereafter to seek its cause in the female genital system.

As nosologists (particularly Boissier de Sauvages, whose chapter on 'Chlorosis' in his *Nosologie méthodique*[24] was reproduced in its entirety by Diderot in his Encyclopaedia), insisted that perversions of appetite, *pica*, form the distinctive symptom of chlorosis, it became tempting to make the stomach the original seat of the malady. This is the theory adopted resolutely by Gardien, the editor of the article on 'Chlorosis' in the *Dictionnaire des sciences médicales*:

> Chlorosis must be viewed as a hectic gastric fever, in other words the febrile movement is produced by the state of debility caused by disturbance of the digestive functions... The treatment methods sanctioned by experience prove that lack of vital force in the digestive organs, which is the cause of the cessation of menstruation, is also the main cause of chlorosis ... The atonic state of the system produces first a lack of periodic evacuation and, as it becomes more severe, causes also the development of this discoloration which we call chlorosis.[25]

We are moving away from traditional Galenic humoralism. What is incriminated here is sometimes spasm, sometimes lack of vital force (following on spasm) and, finally, inflammation. But at the end of the day it is a similar image of displacement of the blood mass that is submitted. The only difference lies in the fact that the original obstruction occurs in the digestive organs and not in the uterus: blood is retained at the gastric level. Such, as we have seen, was the opinion of Broussais. This aetiological hypothesis was also to have a long life, thanks to several adjustments and adaptations made to bring it into line with contemporary knowledge. The cause of the lack of vital force which constitutes chlorosis was thus said to reside principally, not in a disorder of menstrual evacuation, but in a disturbance of absorptive functions, in what was to be called at the end of the century a 'digestive neurosis'.

A PSYCHOLOGICAL COMPLAINT?

If dyspepsia succeeded in changing its role from that of a result (or, literally, a 'symptom') of a disorder to that of its prime cause, how much more easy was it for a similar shift to take place in respect of what the early nosologists of *morbus virgineus* called its psychological manifestations. Could not chlorosis be regarded as the result of a mental disorder? This was at any rate the conviction of Sydenham, who argued for a close relationship between hysteria (in women), chlorosis (in young girls) and hypochondriasis (in men): they were, indeed, humoral disorders, but is not the disorder itself only the result of the

'spiritual disorder'?[26] Persuaded of the truth of this nervous aetiology, Sydenham was still sensible enough to propose a treatment aimed at curing 'the mental disorder' by 'fortifying the blood', chiefly by means of ferruginous preparations. His methods were not without success, whereas a regime of 'psychotherapy', corresponding more closely with the aetiological hypothesis, would surely have been ineffective.

But the idea of an emotional aetiology for chlorosis was to persist and hold its own against increasingly compelling evidence in favour of a blood disorder due to a deficiency of iron and of red cells. In 1843, contrary to the views of Andral, Bouillaud, Blaud and Pujol, the gynaecologist Colombat argued in favour of a nervous aetiology:

> We think that the chief cause of this malady is nothing other than a general asthenia of the nervous system, in particular the nerves of the ganglionic system or of the organic force which presides over digestive, circulatory, nutritive and genital functions.

A 'nervous' hypothesis allows one to take into account all 'moral causes'. The list of causes enumerated by Colombat is long enough to include, in addition and in passing, some more relevant factors: for example, haemorrhages, nutritional deficiencies. But how many emotional disturbances, how many 'vices' also form part of this cortège of 'predisposing causes':

> the female sex, the age of puberty, a hereditary predisposition, rapid and precocious growth, a weak and melancholic constitution; a lymphatic, scrofulous, nervous temperament, lack of or abuse of the physical pleasures of love; the state of widowhood, onanism, abrupt and prolonged cessation of menstruation, too strong a menstrual flow, frequent haemorrhages; and, finally, all those circumstances that can disturb nervous activity, such as unhappy moral affects, grief, conflict, nostalgia, sadness, captivity, melancholia accompanying an unhappy love affair.
>
> *Palleest omnis amans, color hic at aptus amanti* (Ovid).
>
> The general causes of chlorosis are low-lying, humid, cold environments, not open to the rays of the sun, including quarries, mines, prisons, weaving shops, low workrooms, deep valleys covered with trees, the dark, narrow and airless streets of a large town. Times of want, a prolonged diet of heavy, indigestible foodstuffs that have been subjected to unnatural changes, abuse of warm drinks, of vinegar and of green fruits and raw foods, excessive fatigue, and finally lack of exercise, a sedentary, soft, lazy and voluptuous life – these are the causes of the nervous asthenia which give rise to the functional disturbances that constitute chlorosis.[27]

In the article on 'Dissoluteness' in his *Dictionnaire des passions*, Poujol was to insist on 'anaemia caused by onanism or by incontinence', which had already been mentioned by Tissot.[28] But the doctrine that was generally accepted was to incriminate not so much the misconduct as the personality of chlorotic patients. Trousseau puts it as follows:

> Let us consider which phenomena, other than pallor, are characteristic of the malady. These phenomena relate almost exclusively to the nervous system. Intelligence, sensibility, and the muscular motility of the biological and the organic systems are all greatly altered. It is rare for a young chlorotic girl not to experience such disorders of the understanding, which are familiar to us all from numerous examples. They become irritable and strange, and their intellectual disturbances sometimes amount to madness. If we examine their skin very carefully we find that in a great number of points its sensitivity is impaired and in others, though more rarely, it is hypersensitive.[29]

To which symptoms he adds neuralgias, convulsions, marked changes 'in the various secretions of the organism'. The disorder is ultimately ineradicable:

> It has above all this peculiarity, that it leaves an almost indelible impression, so that if a young girl has once had serious chlorosis, she bears traces of it for almost the whole of her life. If you carefully question middle-aged women who have had several bouts of chlorosis you will find that they show neuropathic symptoms from which they are very rarely free.[30]

Parrot, author of the very well documented article on chlorosis in the *Dictionnaire encyclopédique des sciences médicales*, abounds in the same sentiments as Trousseau. One might think he were talking of anorexia nervosa rather than of chlorosis. According to him the disorders of chlorosis are 'essentially neuropathic in their physiognomy'. 'Chlorosis borders upon sensitive hysteria', so much so that 'in a large number of cases the boundary between the two maladies is almost impossible to determine, for they interpenetrate and interfuse'. How does the

disease come about? Through an 'injurious cause' which provokes a moral shock and 'discharges the disorder into the organism'. To sum up, 'this is an affection which acts as a kind of hyphen between disorders of the blood and disorders of the nerves; between haematic dyscrasias and neuroses'.[31] This idea corroborates that of Des Esseintes in his clinical dossier, as described by Huysmans,[32] and accounts for the development of the disease between chlorotic childhood and the end of adolescence, when the nerves 'gain the upper hand'.

Chlorosis has, then, its romantic connotations. In the article on 'Passions' in the same *Dictionnaire encyclopédique des sciences médicales* Brochin devotes a long paragraph to chlorosis, illustrating it by one of those 'case histories' on which physicians, from Hippocrates to Freud, have so often laid the burden of theoretical proof:

> For my part I shall never forget a beautiful, young girl to whom I was attached in a purely paternal way, who was the picture of health and good physique. She belonged to a family which was free of all hereditary disease, had herself no morbid history, and there was nothing about her to make one suspect any form of diathesis. Yet I saw her gradually lose her freshness and her natural gaiety, grow melancholy, anaemic and thin, grow weaker every day, cough although examination revealed not the slightest sign of a pulmonary lesion, lose her appetite, be unable to digest the little nourishment it was possible to make her take, wither away and finally contract a hectic fever and die, without any of her friends, who were as devoted as they were intelligent, being able by their care to check for an instant or to modify in any way this fatal progress of a disease that has no name and no cause... other than that of which I knew the secret, a violent love, the first and only one she experienced, for a man who in no way returned it.[33]

One could therefore die of *chlorosis amatoria* in 1885 (this was Brochin's formula), just as one died of it three centuries earlier. Brochin, however, held reactionary views attached to anachronistic ideas.

IRON-DEFICIENT ANAEMIA

Blood was causally implicated from the very start. But changes in blood were regarded as consequences of the disorder: putrefaction, retention, excess of phlegm, such were the end products of a disease that was generally assumed to be mechanistic, gastric, mental or utero-ovarian. The most conspicuous and the most constant finding, however, was pallor – and not amenorrhoea, pica or a nervous state.

In the nineteenth century doctors gradually became able to judge the haematological state of their patients in a quantitative rather than a qualitative way: they could speak with more certainty of the *anaemia* (a term introduced by Andral in 1843) or the *hydraemia* of chlorotic patients.[34] In spite of the many and varied proofs afforded, such findings, based on increasingly accurate measurements, did not suffice to convince those for whom impoverishment of the blood was only a secondary phenomenon – the result of chlorosis rather than its very essence. They refused, like Parrot, to 'confuse chlorosis with anaemia' and fought a rearguard action against those who insisted on interpreting the disease in purely haematological terms. This resistance finally had to yield in the face of biological and laboratory findings. On the battlefield of chlorosis the ancient form of psychosomatic medicine had to acknowledge defeat. In 1863 Jaccoud admitted that it was the decrease in red cells that formed 'the constant lesion'. Once this happens, 'the entire organism declines and every organ suffers in its own way'. There was no longer any question of incriminating the nervous system and of saddling it with the aetiology of chlorosis.

> In the nervous system, which is more impressionable than all the other systems, nutritional disorders are reflected in a wide variety of phenomena. Moral and intellectual changes, stubborn headaches, sensory changes, what are these persistent or erratic neuralgias but, to use the metaphor employed by Romberg, a painful plea on the part of nerves which are begging for a more generous supply of blood?[35]

This is the opinion which was finally to prevail. What emerged from the various methods of making a blood-count (Vierordt, Hayem), of isolating and quantifying haemoglobin (Reichert, Funke, Hoppe-Seyler), was the possibility of defining hypochromic anaemia in terms of a fall in the number of red cells and a proportionally greater decrease in the haemoglobin, with a fall in serum iron. Chlorosis came to be seen as a deficiency disorder, resulting from a

lack of iron. This deficiency may be caused by a nutritional defect or by a constant and hidden loss of blood. As modern textbooks put it:

> The syndrome of chlorosis, the 'green sickness' of the last century and before, may have been no more than iron deficiency in adolescent girls in whom dietary iron was insufficient to meet the needs of growth and menstruation.[36]

CONCLUSION

To summarize what we have been saying: from the earliest times of its recognition, when the medical imagination was busy explaining chlorosis in sexual or psychological terms, there was an effective treatment available in the form of iron, which was used empirically. Hufeland, without knowing anything about the functions of red cells, lauded iron in enthusiastic terms: for him it was 'a great therapeutic agent, for whom no praise is too high, which has so close an affinity with the animal organism for whose very existence it is necessary, and which is bound by such intimate ties to magnetism and to the most mysterious creative forces of the universe'.[37] An appropriate treatment had therefore long existed side by side with a false conception of the disease.

Chlorosis is therefore now spoken of in the past tense. Indeed, it must be emphasized that in our developed societies it has run its full cycle in two respects. On the one hand, it is an imprecise medical concept, purely symptomatic, depending on the appearance of the patients and covering anaemias of very diverse origins; it has been supplanted by a more adequate concept – hypochromic anaemia, or iron deficiency – which depends on several biological factors that can be quantified and treated (red cells, haemoglobin, iron). On the other hand, it is a disorder which has become much more rare, thanks to rising standards of living and of nutrition in developed countries. It is still prevalent, however, in huge areas of the world which are socially and economically underdeveloped. A German dictionary recently went so far as to call it 'a disorder which was frequent several decades ago but which has hardly been seen since the emancipation of women'. Is it really the emancipation of women, the abandoning of 'corsets which cause concealed haemorrhages'[38] that deserves credit for the disappearance of chlorosis? The change may perhaps be attributed in more banal terms to the 'affluent society': even if its detractors would prefer some sort of Golden Age, the modern era does have precisely the advantage, so far as the strength of our red cells is concerned, of being an Age of Iron.

And in losing its imagined affinities with unavowed or ungratified love, with melancholia or with hysteria, chlorosis has certainly also lost its literary appeal. It has paled into insignificance: anaemia has no more heroines. Our psychological wisdom need no longer concern itself with the mental state of chlorotic girls: it can now more legitimately turn to the strange dreams which learned men have projected on to these blank pages.

NOTES

1 Hippocrates, *Oeuvres complètes*, transl. by E. Littré (Paris, 1861), vol. IX, pp. 64–65. See also *Coan Prénotions* (1846), vol. V, pp. 656–657.

2 Hippocrates, *Oeuvres complètes* (Paris, 1853), vol. VIII, pp. 466–471.

3 Johann Lange (Langius) (1485–1565), *Medicinalium epistolarum miscellanea* (Basel, 1554). The *morbus virgineus* is described in Letter XXI, pp. 74–77.

4 Mercatus, *De mulierum affectionibus* (Venice, 1587), book II, cap. 6: 'De febre alba et de virginum obstructionis' (*sic*), pp. 201–218. This disorder, he says, affects the most beautiful women and it is difficult to account for it.

5 Ambroise Paré, *Les oeuvres* (1561). We quote from the 8th edition, Paris, 1627. Chlorosis is discussed in book XXIV, *De la génération*.

6 J. Varandal (Varandaeus), *De morbis et affectibus mulierum* (Geneva, 1620), ch. I, pp. 1–2.

7 Paré, *Les oeuvres*, book XXIV, ch. 64, p. 985.

8 This line from Ovid's *Art of love*, book I, p. 729, had already been quoted by Lange and by Mercato. It was to be repeated, in reference to chlorotic patients, up to the end of the nineteenth century.

9 Varandal, *De morbis et affectibus mulierum*. An excellent twentieth-century physician, Professor Maurice Roch, quotes the following lines said to have been composed for the tomb of a chlorotic girl:

> Pauvre fille, que je te plains
> De mourir d'une maladie
> Dont il est tant de medecins.
> (Poor girl, how I pity you,
> Dying from a malady
> For which there are so many physicians.)

10 M. de Montaigne, *Essais*, ed. P. Villey (Paris, 1965), vol. I, ch. XIV, p. 60.

11 Lazare Rivière (1589–1655) of Montpellier, was a disciple of Varandal. His *Praxis medica* was edited in Paris in 1640. Our quotation is from *La pratique de la médecine*, transl. F. Deboze (2 vols., Lyon, 1682), vol. II, book XV, ch. I, pp. 318–327.

12 Daniel Sennert (1572–1637) was regarded as an arbiter between the Galenic tradition and the iatrochemistry derived from Paracelsus. The quotation is from *Opera*

omnia (3 vols., Lyon, 1560), vol. III, *Practicae medicinae*, book IV, part II, sect. III, cap. II. De morbo virgineo seu febre alba, et foedis virginum coloribus, pp. 79–84.

13 Iron, associated with the God Mars and the Planet of Mars, was closely studied by the early chemists, such as Libavius (1560–1616) who praised its therapeutic properties.

14 Our quotation is from: T. Renaudot, *Recueil général des questions traitées es conférences du Bureau d'Adresse* (4 vols., Paris, 1655), vol. II, pp. 825–831.

15 *Ibid.*

16 *Ibid.* This passage provides an excellent illustration of the causal system of Ancient Medicine, going back at least to Galen. Coquetry in young girls and their choice of 'bad food' belong to the category of procatarctic (procatarctiques) or immediate causes. 'Mucous, viscous blood' is the pre-existing, internal cause, also called the predisposing cause. Thanks to this system of causality, Ancient Medicine was also able to invoke the passions, the effects of climate, 'erroneous ways of life', as *external*, immediate causes. Cf. Jean Starobinski; 'The history of passion', in *La Passion*; *Nouvelle revue de psychanalyse* **21** (Paris, Spring 1980), pp. 51–76.

17 Rivière, *La pratique de la médecine*.

18 *Encyclopédie méthodique*, serie *Médecine*, vol. IV, 1792, article on Chlorosis by N. Chambon: he praises the good effects of riding, expressing the wish that 'girls would ride in the same way as men' and adding: 'Dancing is an agreeable pastime for nearly all women; it is a salutary one for chlorotic girls. One must recognize that the rhythm which dictates measured steps also lessens the fatigue, because movement which has no uncertainty is easier to endure.' We come later to remarks of which the social significance is inescapable: 'When the heart is preoccupied by a nascent passion, functions languish and the circulation is so weak that it can be destroyed by this tiring concentration of attention on one and the same object. It is then wise to have a multiplicity of diversions, in order to prevent too strong an affection; but this precept is difficult to carry out. There is another remedy, which is to choose one's associates so that they consist only of persons who come together in order to avoid dangerous passions which parental control is unable to destroy, and often only strengthens, and which often lead to fatal excesses if the women experiencing them are forced to conceal them from those around them.' There is clearly a romantic side to chlorosis. Marriage in these circumstances seems to be the antidote of passion: 'Since it is commonly observed that amorous pleasures induce menstruation, marriage would seem to offer a cure in cases of chlorosis. It would also afford a useful means of ending the destructive effects of a strong passion which would have caused disturbances of function that would prove harmful to the preservation of health.' There was another remedy which received equal commendation and which employed medical justification for the artistic education of young girls: 'Among the pastimes which can divert the mind from love, the study of the fine arts also offers a possible entertainment if the patient belongs to a class which is able to indulge in it; but it must not be forgotten that the weak state of a chlorotic girl makes it impossible for her to restrict herself for a long time to a single occupation and often precludes movement. This does not apply to some movements which provide a certain amount of exercise, such as singing, playing instruments, etc.' (pp. 823–824). See also A. Tissot, *Avis du peuple* (2 vols., Lausanne, 1792), vol. II, ch. XXVI, pp. 34–47.

19 Chambon, *Encylopédie méthodique*, p. 820.

20 These methods are mentioned by Dr Colombat de l'Isère, in his *Traité complet des maladies des femmes* (Paris, 1843), pp. 1006–1017. He quotes them, but does not approve of them. His preferences lie, reasonably enough, in good and abundant food, in a 'dry, airy environment, with plenty of sun and, above all, living in the mountains'. He favours walking, dancing, sea bathing and the mental distractions afforded by travel. His prescriptions for good hygiene are not entirely free of moral considerations: he is against 'too tight corsets', too much sleep, beds that are too warm or too soft, 'particularly for those whose chlorotic state is maintained under the influence of contrary love'. He goes on to enumerate further prohibitions – those which might possibly serve to nourish a passionate state of mind: 'One should forbid stimulating drinks, the use of wine, overrich food, lively emotions, attendance at balls and playhouses, the reading of too passionate novels and the viewing of lascivious pictures; finally, one should avoid all possible circumstances that might arouse emotions and excite too ardent passions. It is precisely in these cases that one must insist on warm drinks, warm baths and above all constant distraction of the mind.' This rather stern regime is coupled, fortunately, with pharmaceutical treatment in which iron features prominently in its various forms (especially Blaud's pills, the forerunners of the P.P.P.P.P.P. – 'petites pilules pink pour personnes pâles' (little pink pills for pale persons). N.B. Flaubert to Louise Colet: 'We should all take iron to rid us of the gothic chloroses transmitted to us by Rousseau, Chateaubriand and Lamartine.'

21 L. Labat, article on Chlorosis in the *Dictionnaire de le conversation* (Paris, 1834), vol. XIV, pp. 157–161.

22 A. Trousseau and H. Pidoux, *Traité de thérapeutique* (2 vols., Paris, 1862), vol. II, p. 102.

23 V. Hutinel, *Les maladies des enfants* (5 vols., Paris, 1909), vol. II, pp. 464–476.

24 F. Boissier de Sauvages, *Nosologie méthodique* (3 vols., Paris, 1771), vol. III, pp. 460–467. For Sauvages true chlorosis was still governed by menostasia (suppression of menses). He maintains that in addition to 'true paleness of colour' there is a variety which he calls 'chlorosis of love': it 'affects girls who feel the pangs of love: it is accompanied by profound melancholy, love of solitude, continuous sadness, and a mind that dwells constantly on the object of desire'.

25 C.-M. Gardien, *Dictionnaire des sciences médicales* (Paris, 1813, Panckoucke), vol. V, pp. 129–137. Moreau de la Sarthe defends the same theory in his article on '*Pale complexions*' in the *Encyclopédie méthodique*, vol. XI. He criticizes the article on 'Chlorosis' published by Chambon in 1792 in the same dictionary and, following Ballard and Chaussier, he incriminates 'the profound and possibly neuralgic change in the digestive organs'. One may thus say that the dominant theory at the beginning of the nineteenth century was that invoking a gastric or digestive cause, which itself was influenced by moral or emotional factors. Hence the possibility of supporting a psychosomatic causal chain.

26 The fact that editions of Sydenham, the English Hippocrates (1624–1689), were still being published in 1838 gives us some idea of the longevity of medical theories before the era of experimental medicine. Our quotation is from *La médecine pratique de Sydenham*, transl. A.-F. Jault (2 vols., Montpellier, 1838), vol. II, pp. 157–158. The 'spirits' of which Sydenham speaks are of course the 'animal spirits' of Galenic tradition, a subtle vapour produced from the blood or from the 'natural' spirits formed in the heart. For Cullen, by contrast, chlorosis was a kind of hypochondriasis, and hypochondriasis was a 'state of the soul'. Cf. M. Cullen, *Elements de Médecine pratique*, transl. E.-F.-M. Bosquillon (2 vols., Paris, 1787), vol II, pp. 299–312. Cullen's translator and editor adds a note in which he disagrees. The note is worth quoting,

since for the modern reader it presents a strange mixture of 'correct' intuition and 'erroneous' hypotheses: 'It must be said that in this disorder there seems to be a deficiency in the red cells of the blood and even a lack of a due amount of coaguable lymph; this is why the most fluid parts of the blood separate and give rise to anasarchia (anasarque). We cannot attribute chlorosis to the stomach or the alimentary canal, since it is not preceded by a loss of appetite. It seems to exist in the viscera which are involved in the preparation of chyle: but it is the uterus which determines whether these viscera are affected' (p. 11).

27 Colombat de l'Isere, *Traité complet des maladies des femmes* (Paris, 1843), pp. 993–994. Here we have the familiar reference to Ovid, as in Mercato, Varandal and others. These views recur even in S. D. L'Héritier, whose *Traité de chimie pathologique* (Paris, 1842) may be regarded as a very modern book: 'It is possible that there is some other less perceptible change which is connected no doubt with the nature of the ganglionic nervous system or the system in which all the disorders examined seem to have their origin' (p. 249).

28 F.-A. A. Poujol, *Dictionnaire des facultés intellectuelles et affectives de l'âme*, *Encyclopédie théologique* (Migne) (Paris, 1849) vol. XXXIX, col. 634–635. André Tissot, in *L'onanisme* (7th edition, Lausanne, 1781, pp. 60–61), emphasizes the thinness, pallor and weakness of masturbators. He prescribes, in addition to fresh air and exercise, iron (or 'Mars'), quinine, camomile.

29 A. Trousseau, *Clinique médicale de l'Hôtel-Dieu de Paris* (3 vols., Paris, 1865), vol. III, lesson LXXXV, on true and false chloroses, pp. 492–507.

30 *Ibid.* pp. 498–499.

31 J. Parrot, in *Dictionnaire encyclopédique des sciences médicales*, ed. A. Dechambre (Paris, 1876), vol. XVI, pp. 699–719.

32 J.-K. Huysmans, *A Rebours*, ed. Marc Fumaroli (Paris, 1977, Gallimard), coll. Folio, p. 80.

33 H. Brochin, article on 'Passions, moral affections', in *Dictionnaire encyclopédique des sciences médicales*, ed. A. Dechambre (Paris, 1876), vol. LXXIII, pp. 524–525.

34 The word *anaemia* has existed in zoology since the days of Aristotle. It is used by some seventeenth-century writers to designate a fall in the total quantity of blood, or to denote an 'epidemic' disorder of a particular type (the miners' 'disease in the mine of Anzin', described by Hallé). Cf. the *Dictionnaire des sciences médicales* (Paris, 1813, Panckoucke) vol. II, article on 'Anaemia'. For the quasi-synonymous nature of chlorosis and anaemia, see Bouillaud, *De la chlorose et de l'anaemie*, Académie de Médecine, 15 February 1859, and the article on 'Anaemia' (written by C. Potain), in vol. IV, of the *Dictionnaire encyclopédique des sciences médicales* ed. A. Dechambre (Paris, 1876), 327–406.

35 F. S. Jaccoud, *De l'humorisme ancien comparé à l'humorisme moderne* (Paris, 1863), pp. 99–100.

36 *Harrison's Principles of Internal Medicine*, ed. J. Kurt (7th edn, McGraw-Hill, 1974), p. 1582.

37 C.-G. Hufeland (1762–1836), *Enchiridion medicum, ou manuel de médecine pratique*, transl. A.-J.-L. Jourdain (Paris, 1838), pp. 500–501. Hufeland was one of those physicians who thought that the disease may be 'produced by onanism'. To iron therapy he then added 'a diet of succulent meat'.

38 *Reallexikon der Medizin*, ed. G. Thiele and H. Walter (Urban-Schwarzenberg, 1967), col. 102. For the medical history of chlorosis from the middle of the 19th century, see Eugene Stransky, 'On the history of chlorosis', *Episteme* (Milan), January–March 1974, vol. VIII, pp. 26–45. References to the history of chlorosis in English literature are to be found in the very detailed article by Robert P. Hudson, 'The biography of disease: lessons from chlorosis', *Bulletin on the History of Medicine* **51** (1977), 448–463. For the history of gynaecology, with which chlorosis is so closely associated, see the Esther Fischer-Homberger's *Krankheit Frau* (Bern, 1979, Hans Huber).