The Appreciation of Lice

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Most birds and mammals have associated with them one or more species of louse, although this is a fact rarely mentioned by natural history books and broadcasts. This is a pity, for the chosen life-style of lice presents many points of interest. True, any naturalist wishing to study the life of the louse is faced with considerable difficulties, for lice will abandon, or at least behave abnormally on, any dead or injured animal. So it is that the overwhelming majority of lice have never been properly studied while alive. Many, indeed, have never even been seen alive and are known only as Latin names attached to museum specimens.

Now, however, an opportunity unprecedented in recent times has been afforded naturalists for the study of at least one louse alive and in its natural surroundings: on the heads of their own children! The extraordinary increase in the prevalence of head lice which has occurred in all the countries of the Western world has been accompanied by a yet more extraordinary change in their distribution. They are now found somewhat less frequently in their traditional haunts amongst the children of industrial, working class areas but much more frequently on the children of the professional middle class.

Now that all of us with children have improved chances of being able to study living head lice, it is perhaps timely for naturalists to know something more about them. This may not make their appearance any more welcome, but it will make the visitation more interesting, will perhaps reduce the drama of the occasion, and will certainly make for more effective treatment.

It seems that the increase of head lice is being matched by rises in the incidence of the other two human lice, the crab louse and the clothing louse, although their prevalence is much harder to quantify.

What is a louse? Entomologists restrict the use of the word, applying it only to insects which comply with two conditions. Firstly, they must be ectoparasites of warm-blooded animals: birds or mammals. Secondly, they must spend the whole of their life-cycle on the host animal, never voluntarily leaving it save for another in contact. Lice lay their eggs on the host, they hatch on the host and the insects are not only born but live and die on the host as well. How different from a flea!

There are in fact several Orders of insect which fulfil these two criteria and hence are regarded as lice. They were all formerly united in the old Order Phthiraptera, but most workers now recognise that while some degree of relationship is present they cannot all be placed together in a single group. The
Fig. 1 Incidence of head lice in English state schools. The numbers of individual children found lousy in state schools in England is shown. Lighter cases are frequently missed at school inspections and research shows that the true incidence is approximately double that here recorded. If children under school age are included and if the figures for Scotland, Wales and Northern Ireland are also added, then the total incidence may exceed half a million cases annually: about one child in fifteen. The increases recorded for 1978–1980 are the steepest reported in this century.

classification of lice above the level of Families is the subject of friendly dispute amongst taxonomists, and until a consensus is reached, I adopt a conservative position by recognising three Orders of lice.

However classified, the whole of the lice have much in common. They are all hemimetabolous insects; that is to say that the young, called nymphs, closely resemble the adults and that no pupal stage precedes the adult.

All lice are small, but a few are minute. The louse of the pig is the longest at about 5mm in length; on the other hand, some lice of the squirrel can hardly be seen with the naked eye. All are quite wingless and all have short stumpy legs completely incapable of jumping or even of walking efficiently on a flat surface. These legs are equipped with large, sometimes enormous, claws which facilitate climbing amongst hair or feathers. Regardless of Order, and with almost no exceptions, the lice which live on birds have two claws on each leg while those which live on mammals have but one.

Fig. 2 Head inspections in English state schools. The numbers of individual heads examined for lice in English state schools is shown. The cost of these is estimated to exceed £1.5 million annually (£2.4 million for the whole of the United Kingdom). Consideration is being given to more cost effective methods of detection, especially as the traditional head inspection usually fails to discover light or early cases.

All are soft defenceless creatures vulnerable to both predators and hostile climatic conditions were ever they foolish enough to leave the protection and shelter afforded them by their hosts. Paradoxically, their hosts constitute at once their only means of support and also their only enemies.

It is crucial to the understanding of lice to appreciate that transmission from host to host is achieved by contact between the hosts, during which the lice walk across. The contact need only be brief, a warm louse is agile and fast, quite different from the cold louse taken from its proper environment and placed on a smooth surface.

The louse of the zebra does not walk down the leg of the zebra, step off onto the grass and wait for another zebra to come past. It would be certain death to do so, for lice are not adapted for independent life. Nor do the lice of seals swim through the ocean waves in search of other seals. Lice are spread by contact, and this is true of human lice also.

The eggs of all lice are carried on the host, being glued to hair or feathers. They hatch by pushing off a lid, the operculum, which is always at that end of the oval egg which is furthest from the skin of the host.

Lice are extremely host-specific, each being found on one host only, or at most, on a small number of related hosts. Not only do they usually prefer one host but they often specialise on one part only of that host. This allows several species of louse to exploit the same host without competition. This is particularly marked in birds, where, for example, the louse of the flight feathers may be different from that of the body, while yet another species inhabits the head. The domestic hen may carry five different species of lice at one, each in its own niche. The same phenomenon is seen in the lice of man, each of our three types specialising on its own part of our bodies.
Fig. 3 Distribution of lousiness in English state schools, 1976. Since records began in the nineteenth century the head louse was always most prevalent in the working-class areas of industrial cities. 1976 was the last year in which the traditional pattern was evident. (The apparent high incidence in East Sussex is a statistical anomaly, caused by an intensive local campaign against the insect, resulting in an unusually high detection rate.) Modified information by kind permission of Barbara F. Weller (DHSS).

Fig. 4 Distribution of lousiness in English state schools, 1980. By 1980 the incidence of head lice became greatest amongst rural, suburban, and middle class children. Compare the incidence for the industrial North-East of England as between 1976 and 1980. The increasingly successful use of campaigns in the industrial cities may help to account for their reducing incidence of lousiness. Modified information by kind permission of Barbara F. Weller (DHSS).
Mallophagan lice steal a march over all other dermatophagous insects by eating the skin while it is still on the living host. Their mouthparts are adapted for rasping and scraping at the skin, hence their preferred popular name, the chewing lice. (The alternative names of bird lice and biting lice are best not used, for Mallophaga are by no means confined to birds and the term biting lice causes confusion with another group, as will be seen.) A few of the chewing lice will scrape one spot until they draw blood which they will then drink, but haematophagy is secondary in this group.

Some Mallophaga have bizarre physical adaptations the purpose of which defeats guessing. Why does Harrisoniella irrorata, a louse of the Albatross, have such large antennae that it uses them to walk with, substituting for the first pair of true legs which have become reduced to mere vestiges? Others have odd life styles. One louse of the pelican enters its beak and feeds by scraping the inside of the pouch, but must return to the feathers to lay eggs. The Mallophagan louse of the domestic cat has a slot in the front of its head, into which it fits cat hairs. Presumably the slot is used to scrape skin debris from the hairs, but no-one knows for certain.

The smallest of my three Orders of lice is the Rhynchophthirinaptera, a puzzling group containing only two species. The one has undertaken the ambitious task of becoming a blood sucking ectoparasite of elephants, while the other has the hardly less daunting task of abstracting the blood of warthogs. In both cases the whole head functions as a lancet and is inserted deep into the thick skin in the search for blood. Oddly, their mandibles are crossed and cut inwards with their outer faces.

Of most interest to medical entomologists is the third Order, the Anoplura, for this group contains the human lice. The known species in the Order currently number 560, the total having recently rapidly increased as more interest has been taken in them. It seems likely that they are a comparatively new group in evolutionary terms. From their origin somewhere amongst the rodents they have explosively radiated, colonizing new groups of hosts and producing new species of lice as they have done so. The processes of colonisation and speciation seem still actively in progress at the present time.

The group has blood sucking as its characteristic feature, not scraping for it as do a few Mallophaga, nor cutting for it, as do the Rynchophthirinaptera, but delicately probing for it with highly specialised mouthparts which search out capillaries under the skin. Normally little can be seen of the mouthparts for they are fully retracted into a housing running the length of the head. When the tiny mouth is pressed against the skin these probes are shot deep into it. They consist of two concentric tubes, down the inner of which saliva is pumped into the wound and up the outer of which a mixture of blood and saliva is drawn.

Anopluran lice, known as the sucking lice, are found only on mammals. They are, as yet, absent from marsupials and from all the carnivores apart from the dog, the otter, and the seals and walrus. They provide examples of speciation still apparently proceeding apace, the best known case being that of the human lice. We possess two species, Pthirus pubis, a strange louse with no close relatives save...
a recently confirmed species on gorillas, and *Pediculus humanus* which exists as three clearly differentiated sub-species. It seems that *Pediculus humanus capitis*, the human head louse, was the original form but that when man took to wearing clothes a new sub-species separated off, adapted to life in clothing. This is the human clothing louse, *Pediculus humanus humanus*, still quite capable of interbreeding with head lice, but doing so sufficiently rarely for the two to retain separate sub-specific identities.

The third member of the species is *Pediculus humanus mjöbergi*, which is not found on man but on certain South American monkeys of the family Cebidae. It seems that when man first penetrated the new world across the Bering Straits, these new world monkeys, until then possessing no lice of their own, were able to acquire the human head louse, which then developed into the third sub-species.

So distinct are these three sub-species that many would like to regard them as separate closely related species. Some recent field work failed to find hybrids between head and clothing lice in Ethiopia, but some Russian workers claim that it is difficult to find lice which are not to some extent hybridised. They interbreed so readily in the laboratory that I find it impossible to believe that they are genetically isolated in Nature. Hybridisation of *P. h. mjöbergi* has not been studied, but I subscribe to the theory of three good sub-species and not three separate species.

The human head louse is in many ways a very typical louse, and has been well studied by good biologists. It is therefore a suitable choice for an example of an Anopluran louse. We must approach it with as open a mind as possible, for nearly all of us have preconceived ideas about lice which do not accord with established fact.

The eggs of the head louse are glued to the hair with a clear, quick-setting secretion of the female's accessory glands. They will not hatch at temperatures below 22°C, at which they take sixteen days to hatch. The optimum temperature for hatching is no less than 31°C, at which the lice will emerge in just seven days.

The only region of the head guaranteed to sustain temperatures warm enough to allow any, let alone rapid, hatching, is the scalp itself, and so eggs are normally laid glued to the base of hairs, touching or nearly touching the scalp. It is unusual for more than one viable egg to be present on the same hair at the same time. When searched for, live eggs will be seen against the background of the scalp and

Fig. 6 Anterior view of a human louse. Lice are entirely wingless and their short legs are incapable of jumping. This head-on view of a young crab louse clearly shows the claws, which are adapted for climbing amongst hair. No louse is equipped for independent life away from the host, nor is any louse capable of efficient progression along a smooth surface.

Fig. 7 A young head louse and an unhatched egg. This young louse has just completed its first moult. Shortly it will feed and swell to a larger size before its new skin becomes fully hardened. An unhatched egg is attached to the same hair which is supporting the louse. The exit-lid is clearly shown. This bears a group of about sixteen thick-rimmed openings associated with respiration.
are usually camouflaged by being the same colour as the scalp. The female has some ability to change the shade of the egg in order to provide minimum contrast.

Hatching is rather remarkable. When the young louse pushes off the egg cap a circular hole is made in the eggshell which is somewhat too small for the insect to get out through. The louse solves this problem by sucking in air, bubbles of which pass right through it and collect in the eggshell behind. Gradually the pressure builds up until the louse is squeezed out through the opening like a cork from a bottle.

The empty eggshell, termed a nit, has still a rôle to play, which is why it is so firmly attached to the hair that it may remain there until that hair falls from the head, as much as two years into the future. At the time of hatching the newly empty eggshell becomes a brilliant snowy white in colour, an example of distracting colouration. It is now an advantage for the nit to be seen, for this draws attention away from the darker living eggs. This mechanism appears common in the lice of animals which groom themselves or each other by sight. How well it works with head lice! So much time is wasted combing harmless nits from children’s heads while live eggs, usually too near the scalp to get a comb under, escape unharmed.

The great Aristotle was only partially deceived by this. He records that the eggs of lice never hatch, but clearly did not realise that the vast majority of eggs in the hair of an established infection are empty shells, long hatched.

Nits grow out from the scalp with the growing hair, and can be used to judge the duration of an infection. Human hair grows at approximately one centimetre each month, and if the outmost nits are found six centimetres from the scalp then they were laid half a year before. The average duration of a head louse infection on a British schoolchild, at the time of discovery, is four months. There is little point in recommending the immediate exclusion of the child from school, for any onward transmission will have occurred long before.

Conversely, the position of nits can be used to judge the duration of a cure. If no lice are seen, and if no nits can be found closer than one centimetre to the scalp then the infection is extinct and no further action is required.

The newly hatched louse is a pale, almost transparent, helpless little creature. Place one on the back of the hand and observe it with a good lens. For a moment it merely basks in the warmth, then its head is firmly lowered. Although nothing is felt at the time, its fangs have shot into the skin!
A faint heaving commences at the front of the body, showing that the massive salivary glands, housed in the thorax, have begun pumping saliva into the wound. This contains anti-coagulants, for otherwise the blood might clot in the feeding tubes. Soon a bright red thread can be seen running through the head. This is the mixture of blood and saliva being drawn up from the wound. Two small fast-sticking pumps become visible in the head as they fill with blood. Then, gradually, the gut fills and swells, and as the light shines through it, the little louse comes to resemble a ruby on legs.

Following feeding, the cuticle of the insect begins to darken. The degree to which this happens depends on the colours of the skin and hair of the host, for this is another example of camouflage. The colour change can only occur from lighter to darker through shades of grey, and is not reversible. Black lice on black children in Europe are often thought to be importations, but the ordinarily European head louse can achieve very dark shades when necessary. Lice which never make the change evidently lose the ability to do so, for some lice from blond Scandinavians cannot darken.

The young louse will feed about five times each day for the rest of its life, blood constituting its sole food. Feeding is reduced if the head is very dirty, and contrary to popular belief, head lice grow best and reach highest numbers on heads which are reasonably clean.

After approximately ten blood meals, being then two days old if conditions are good, the creature can moult. A slit develops down the back, out of which the second-stage louse struggles. It feeds almost at once, swells to a size larger than before and resumes normal life, leaving behind a cast skin which falls from the head. Being very light, these empty skins can be blown about and are responsible for the erroneous statement in some older textbooks that lice can be blown from person to person in a high wind.

The louse will moult twice again, about the fifth and tenth days from hatching, and is then an adult. Mating may be quite prolonged. The male, who is appreciably smaller than his mate, takes up a position beneath her, and both can feed while mating if they wish.

Reproduction presents a number of peculiar, even unique, features. The sex ratio is usually a skew one, females being more numerous by almost four to one. This may be an adaptation which increases the egg laying rate without having to reduce the size of the egg. It seems that there are several kinds of female, probably

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Fig. 10  An abraded nit. Hatched head louse eggs remain attached to the hair until that hair falls from the head. They may become so worn away, by abrasion against other hairs, that little more remains of them than the glue which attaches them. Judging from its distance from the scalp, this egg was laid more than a year before.

Fig. 11  A hair muff or pseudo-nit. A number of natural conditions will mimic nits. This is not an abraded nit, but dried secretion from unusually active glands associated with the hair root. The little girl from whom it came had been several times excluded from school because the nurses could not distinguish a muff from a nit.
five, each distinguished only by showing a characteristic sex ratio amongst its offspring. This is further complicated by there being probably two kinds of male. One mating combination produces a fifty-fifty sex ratio amongst the offspring, another produces all males, but all others produce a preponderance of females.

The study of this phenomenon is hindered by the fact that the chromosomes never condense, so that even the chromosome number, believed to be twelve, is in some doubt.

Spermatogenesis is unique, for there are two reduction divisions. The four products of the first meiosis do not separate, but stay together and commence dividing mitotically to form a tissue of two hundred and fifty six cells. Eventually the diploid chromosome number is restored in some of the cells, which then enlarge and undergo a second reduction division, an unequal one much resembling oogenesis. The three “polar bodies” so produced develop into sperm.

The “egg” aborts. It is tempting to regard this strange process as representing a suppressed, interpolated, parthenogenetic extra generation, until one recollects that all this is occurring in the male!

Females lay about eight eggs a day under good conditions. Most are laid at night when the host is still. This rhythm is a circadian one, persisting for at least some days if the insects are kept in continuous darkness.

Females of Pediculus humanus have lost their spermatheca, the sperm storage organ, and must therefore mate before laying each egg if it is to have the best chance of being fertile. Deprived of a male, a female’s second egg is usually fertile, the third occasionally so and the fourth but rarely. Thus frequent mating is essential, and this encourages outbreeding.

In many other insects the first mating of a female, often her only one, is followed by a dispersal phase which may involve a distinct migration or may be a more local search for a new dwelling place for her or her progeny. She may or may not be accompanied by the male. With head lice the dispersal phase begins immediately after the first mating and continues as a powerful urge involving both sexes for the rest of their lives. Nymphs transfer much less readily to new heads.

The high mobility of lice is rarely recognized. Head lice do not exist as isolated groups of castaways marooned on separate islands, but as an actively intermingling community inhabiting an archipelago. A single louse may spend its day on several heads. This has profound implications for control. Treatment on an individual basis, however effective for that individual, does little to reduce the incidence of lousiness in a community, for the treated individuals are exposed to enough untreated ones for them to be soon overrun again. The closer that anti-louse action in any population can come to being both universal and simultaneous the better the results. Each treatment is reinforced by all the others and so made more effective, since re-infection is prevented. The campaign approach is the most successful.

The great mobility of lice between heads leads to another consideration. Lice are spread by contact and must move quickly from scalp to scalp when opportunity presents. Transmission is impeded by intervening masses of long hair, which make the journey from scalp to scalp longer and more hazardous. Short hair encourages lice, long hair is somewhat protective. The scissors, again contrary to popular belief, do not provide a louse control method.

The opportunities to transfer to another head are much more frequent than textbooks imply. The writers are often middle aged, middle class Western males, a group which makes very few social contacts with other members of the human race, ritual handshakes excepted, and finds it difficult to appreciate just how often the rest of humanity do come into touch with each other. Thus it was thought that lice must be spread by hats, by brushes and combs, bedding and cushions, by swimming pools and by railway carriage upholstery, by pets and by chair backs. In recent times the gymnasium mats and school buses became favourite suspects, together with fur linings to hoods. The very multiplicity of supposed methods of transfer should warn against them, and in fact there is no evidence that any method of transmission other than contact has the slightest practical importance. All species of lice are spread by contact and the head louse does not provide an exception.

Of course, lice are found on chair backs, on pillows and in all the near environment of lousy children, but these are dead lice, sick lice, senile or injured lice, or cast skins which only look like lice. Any louse too weak to cling further to its host falls off. It may still move for a while, but being too weak to stay on one host it represents little danger to another. Lice are very mortal, and their bodies must go somewhere!

In the laboratory the absolute post-ovum life-span of a head louse is sixty days. In Nature very few lice will live to reach old age, indeed most die before becoming adult, and a louse which has lived three weeks is unusual.

The causes of death are numerous. Lice have their own diseases, some of which are shared with man, as we shall see. In a laboratory colony the most frequent causes of natural death include the following: damage to the mouthparts during moultine, leading to inability to feed; inability to disengage after mating; rupture of the gut, usually during feeding; the accidental gluing down of the females to their own eggs; and the failure of the mechanism controlling alternate firing of the ovaries, leading to two mature eggs being present at once, causing desperate internal damage.

In Nature however, the greatest threat to the life of any louse is posed by the grooming activities of its host, and this is true of the head louse too. Being such short-lived creatures, lice are simply not worth repairing, and so have lost most of their defences against disease and abilities to recover from serious injury. If a leg is lost, it is not regrown, as can happen in some other insects. The loss of a leg is a common injury, usually caused by scratching fingers, and is invariably fatal. Such lice may die slowly as the result of bacterial invasion through the stump, or quickly as the result of exsanguination or internal injury, but a five-legged louse will always die.

The head louse’s only defence against the scratching finger is to hold on tight to up to six strands of hair, doing its best to avoid being dislodged, which would itself be fatal. Unfortunately, this tight grip increases the chances of having one or more legs pulled off instead.
One of the most effective weapons ever devised against lice is the ordinary pocket comb. Those people who comb frequently and thoroughly do not harbour lice, and this is in perfect accord with the situation found in animals. It is those animals which are too old or too young to groom, or which have arthritic spines or poor teeth, which harbour high numbers of lice. Well-groomed animals rarely have many lice and neither do well-groomed children.

Campaigns against head lice should include positive encouragement of vigorous hair brushing and combing. Indeed, a combing campaign need hardly mention lice. Very many children do not own a comb and sometimes a whole family will only possess one communal comb. Health authorities who issue free combs to children who do not have lice, soon find that they issue less free insecticide to children who do have them. One nurse of my acquaintance issues combs with the exhortation, "If you break their legs, they can't lay eggs!" How right she is!

Washing the hair only produces cleaner lice. Soap and water are not of themselves a louse control method, although the associated extra grooming will be of the highest importance. Throughout their evolutionary history, head lice must have been frequently wet, through rain or swimming, sometimes for days on end. A wet louse closes the elaborate valves it possesses at the entrance to its spiracles. In effect, it holds its breath, and continues to do so until unconscious. A reflex action keeps its claws clamped over strands of hair, and presumably its metabolism is now anaerobic. Shut off thus from the water, the louse can afford to wait some days for it to go away. It is hardly possible to drown a louse.

Lice are more common on the heads of children than on those of adults, and at all ages women and girls have more lice than men and boys. This has nothing to do with the fact that in Western societies females usually have longer hair than males; that is a coincidence. In Britain the proportion of boys infected as compared with girls actually fell between 1940, when boys wore very short hair, and 1973, when boys often wore their hair as long as did the girls.

Certainly women and children, especially girl children, allow the lice more frequent opportunities of transmission, since society permits them to be more demonstratively affectionate than it allows adult men to be. Apart from this, head lice exhibit a relative inability to thrive on males which becomes more pronounced after puberty. After the age of twenty, men rarely have head lice. The cause of this appears to involve at least two factors.

It is known that head lice very strongly favour closely spaced hair. Adult men have many more of their hair follicles empty and resting at any one time than do women and children, and so, even if not obviously thinning, have far fewer hairs on their heads. Head lice seem extraordinarily sensitive to the consequent wider spacing of male hair, perhaps because their short legs have little ability to extend beyond their normal reach.

Additionally there may be something about male blood which causes these lice to reproduce less effectively. It is not known if this is due to the hormone content, but one mechanism has been suggested. Haematophagous insects usually harbour symbiotic bacteria in their guts in order to supply those B-group vitamins too deficient in mammalian blood for insect needs. Various antibiotics ingested with the blood meal will eliminate the bacteria and precipitate a slow decline in the health of the insects. Head lice cannot lay fertile eggs unless some of their symbiotic bacteria are inserted into the eggs before the eggshells are complete, and elaborate mechanisms exist to ensure this. It has been suggested that a diet of male blood upsets these gut bacteria, producing less fecund head lice on men.

With the human clothing louse, Pediculus humanus humanus, the situation must be different, for this louse shows a small but distinct host preference for males over females and for adults over children. Presumably the two sub-species, in attempting to achieve genetic isolation, have chosen ecological niches as widely separated as possible whilst still using the same host species, this reducing the chances of interbreeding. However, I cannot believe that clothing lice infesting a hat, a common situation, do not interbreed with any head lice present on the head in the hat, nor do I believe that when a lousy head is laid on lousy clothing used as a pillow at night that the lice refrain from miscegenation!

In the laboratory hybrids are easily produced. The proportion of hybrid eggs
which are capable of hatching is certainly lower and it is said that there is an increase in gynandromorphs (mosaic intersexes), in the progeny of hybrid crosses, but I have not observed this. Judging by the laboratory insects, hybrids in Nature must be at a marked disadvantage compared with either of the purebred lines, but they are fertile, both when they breed amongst themselves and when they back breed to either parental strain.

There are several reports in the older literature that head lice kept on the body in containers will, over several generations, change into clothing lice. However, yet other workers have kept head lice on their bodies for up to forty-three generations and observed no change. To me it seems clear that the first group of workers happened to have started with hybrid insects, and simply bred out a purer clothing louse strain from them by providing conditions which favoured this selection. The other workers must have started with a pure head louse strain and could not change it, which is hardly surprising.

All this provides more evidence that the clothing louse should be awarded only sub-specific rank, with the name Pediculus humanus humanus. Those who do believe that separate species rank is justified should use Pediculus humanus; both names obey the recognised rules of scientific nomenclature. However, many medical writers continue to use the names Pediculus corporis and Pediculus vestimenti for the clothing louse despite the fact that the International Commission on Zoological Nomenclature has declared them invalid.

Confusion can exist with the common names as well. P. h. humanus is often termed the body louse, despite the fact that it does not live on the body but amongst clothing. There is frequent confusion with the crab louse, which does live on the body but is not the body louse. The term clothing louse seems unambiguous and preferable.

Head and clothing lice resemble one another very closely. Usually it is possible for an experienced worker to tell them apart, but a small proportion of insects cannot be assigned with certainty to either category by physical examination alone.

The major distinctive characteristic of clothing lice is a Behavioural one; they prefer to lay their eggs attached to cloth. So strong is this preference that if deprived of cloth they will often drop their eggs loose rather than attach them to hair. Any eggs which are laid on hair are usually poorly attached and frequently misaligned. Many, but not all, of the occasional reports of clothing lice laying eggs on body hair are due to confusion with the eggs of the crab louse.

In order that they may be provided with sufficient warmth for development and hatching, the eggs of clothing lice are laid attached to the inner clothing, usually very close to the skin. Seams are a favoured site for oviposition. Wool is preferred to cotton and natural fibres to synthetic. Fibre diameter and closeness of weave affect their choice and rough cloth is preferred to smooth. Offered a choice, the females will prefer to lay on cloth which has been worn and therefore smells of man, rather than on freshly laundered material, but heavily soiled cloth is avoided, especially if it is greasy. Lice like to know they are on man, but the clothing louse has no more intrinsic need of dirt than has the head louse.

Providing the temperature is constant, which means in effect that the clothes are worn continuously, the clothing louse eggs will hatch in just the same time as do head louse eggs, seven days in optimal conditions. All other development parameters are also similar. The lice visit the skin about four times a day to feed on blood, a little less frequently than the head louse feeds. Clothing lice, like head lice, take some ten to twelve days to become adult and moult three times on the way; adults can also live about forty more days but rarely do so; females also lay about eight eggs a day and try to mate between each. All that is true of the head louse life cycle is true of the clothing louse too, major differences arising only from the rejection of hair and the adoption of clothing as their home.

Clothing can be removed. Of all 3,000 species of lice, this is the only one which can be removed at will by the host. Too much has been made of this in some medical textbooks, for the whole point is that clothing lice are characteristic of people who do not remove their clothes. It is true that a new dimension is added to transmission, for the exchange of lousy clothing, perhaps sketchily washed but still containing viable eggs, is an additional means of transfer. The general rule of louse transmission is not breached, for the transfer is still by contact, even though it is contact with clothing which is now important.

However, the more usual way by which people acquire clothing lice is for the insects to walk across when fully dressed people are in contact. Even more common must be a two-way exchange of lice. The most favourable time for this kind of transmission is at night, when people, usually poor and wretched, huddle together for warmth. The clothing louse is the louse of abject poverty.

This louse is particularly characteristic of people who only possess one set of clothes, and also most prevalent in cold lands where that one set might be but rarely removed. It is the louse of refugees, of the inadequate, of the wretched and despairing people of the world, of those affected by war, by famine or by natural disasters.

It is the possession and use of two sets of clothes which defeats this louse. When someone changes into his spare set and puts aside those clothes he has just taken off, then any lice in the discarded set will soon die. In cool damp conditions such lice may survive five days before passing the point of no return, but usually they would be fortunate to last three. Eggs survive longer, a maximum of sixteen days, and at temperatures below 22°C they can continue to develop slowly although they cannot hatch. The eggs, then, tend to become synchronised at a point just before hatching. If the clothing is now put on again, the eggs, being warmer, will all hatch rapidly and together. If, before those young lice can mature and lay fresh eggs, the clothing is again exchanged their extinction will follow. Regular exchange between two sets of clothing will prevent and cure lice without any washing or insecticidal treatment whatsoever.

The optimum timing for exchange between sets of clothing is seven days, just before the first hatched nymphs could themselves mature under the best possible circumstances. This may be the origin of the week, for it is strange that a seven day cycle should be so universal in all parts of the world and in so many cultures and religions throughout history. What more natural that people should worship
their God on that day when they have just changed their clothes, are cleanest and have fewest lice!

Of itself, the washing of clothes, once again, merely produces cleaner lice, unless the water is hot enough to kill them. Soap and water are not a louse control method; heat is. Lice may be common on very clean people in parts of the world where it is customary to wash clothes in rivers and lakes. In such cases the possession of several sets of clothes will certainly lead to extra washing and to fewer lice, but it is not the extra washing which is reducing lousiness.

As a rough guide, if washing water is too hot to put one’s hands in, then the lice will die. If the water is cool enough for hand washing the lice will survive. Part of the increase in clothing lice in Western countries may well be due to energy-saving low-temperature washes in washing machines, especially in public laundrettes. We have forgotten why we used to boil our underwear, although it is also true that many modern materials will not withstand high temperatures.

Not only do clothing lice move readily between hosts, they are also very mobile within the confines of a single person. They are active and restless insects, rarely still for more than a few seconds, but certain patterns can be recognised in their behaviour.

Warmth attracts them towards the skin, but only within limits. In the laboratory lice exhibit a narrow temperature preference range, 29–32°C, and will actively avoid temperatures which are either cooler or warmer than this. On a host this preference will normally cause the skin to be attractive to lice, unless for some reason it becomes warmer than usual, when the lice will retreat from it into outer, cooler, layers of clothing.

Strong exercise is enough to cause sufficient warming of the skin to precipitate a temporary withdrawal from it, and the same retreat occurs if the host has a fever. It has often been recorded that lice will leave a patient running a high temperature, and from the observer’s point of view this seems true, for if a fevered patient goes to bed with some of his clothes still on, then the lice in them will leave him and move to the bedclothes. However, from the louse’s point of view this is still only an outwards shift into cooler layers of clothing. It has no intention of leaving the body; it is merely distancing itself from the over-heated skin for the sake of comfort and can make no distinction between clothes and bedclothes.

In the laboratory lice also show strong preferences as regards humidity. They greatly dislike dry air and below a relative humidity of about 40% cannot survive indefinitely, even if allowed to suck blood when they wish. Their preferred relative humidity is in the range 70–90%. At humidities above this they become distressed and seek drier air if possible. In Nature the lice behave similarly. They move outwards in the clothing if the host is perspiring heavily and try to avoid areas damp with sweat. High humidity has particular dangers for clothing lice. Their copious faeces, which normally dry to a fine black powder, remain damp and sticky. The insects can become coated with their own excreta and frequently become stuck to the cloth by it. The insects, then, move closer or further from the skin in relation to changes in the relative humidity or in the

temperature which they encounter. I have spoken of movements inward or outward, but of course lateral movements are also made if they achieve the objective of avoiding uncomfortable temperatures and humidities.

There is only one occasion when lice deliberately leave the host altogether and this is when it dies. I and my associates have kept human clothing lice as rabbit-adapted laboratory colonies for many years, the insects feeding on anaesthetised rabbits. Sometimes we have had the unhappy experience of having a rabbit die under the anaesthetic whilst feeding lice and have therefore been able to observe the reactions of the insects. Often they know of the death of the animal before we do. Feeding ceases at once, the carcass loses all attraction and the lice, normally quite gregarious, spread out, leaving the body as individuals and at random. This occurs long before there could be much drop in temperature of the skin, and is presumably a response to the absence of blood pressure. The lice may be reacting to some chemical signal, a pheromone, given by those who are feeding at the time, for it is remarkable how quickly the alarm affects all the lice, producing a marked agitation followed by rapid abandonment of the body.

Human lice, too, abandon us at the moment of death, spreading out in a desperate search for an alternative host. Lousy people must die sufficiently often in close proximity to others for this strategy to be worth attempting, but only in this furthest extremity of necessity does the louse ever leave its host, save for another in contact.

The louse has killed more human beings than has any other insect, with, perhaps, the malaria mosquito excepted. Historically lice are the major insect vector of disease in temperate and cold lands, as mosquitoes are in hot ones. Much of what in older times was classified as “plague” was not in fact flea-borne bubonic plague but louse-borne typhus or similar diseases. Even today mortality form louse-borne disease remains significant and the total deaths exceed those from several more fashionable insect-borne diseases, including, for example, those from tsetse fly-carried sleeping sickness.

The principal louse-borne diseases of man are three in number: classical typhus, European relapsing fever (better termed louse-borne relapsing fever), and trench fever. Additionally various species of louse play a part in the epidemiology of murine fever, although the disease is primarily transmitted to man by fleas.

Classical typhus is caused by an exceptionally small micro-organism, *Rickettsia prowazeki*. It was once thought that the rickettsiae were related to viruses, but it is now known that they are closer to conventional bacteria. The disease usually enters the body through an abrasion or wound which has become contaminated with the faeces of an infected louse. Less frequently the infection enters *via* the conjunctiva or lung when the dried powdery faeces are blown into the eye or breathed in. Thus it is not necessary to be lousy oneself to acquire the disease, mere association with those who are is enough.

The average incubation period is twelve days and from about the fifth day of this period the rickettsiae are sufficiently numerous in the blood serum, especially in the platelets, for the person to become infectious to any lice sucking his blood.
After this incubation period the patient will feel unwell for a day or two, with giddiness, nausea and aching joints. The succeeding major phase of the disease has a most sudden onset: the temperature rises to 40°C and a violent headache occurs. Soon the sufferer becomes stuporous and intermittently delirious. On about the fifth day of the major phase a rash appears, at first pink, disappearing with pressure, and later copper or purple in colour and petechial. Once the rash is fully developed the patient is much less infectious to lie, for the blood now contains few rickettsiae. The majority of the organisms have been phagocyted by the endothelial cells lining the vascular system, but this process causes great damage to the minor blood vessels of the body, causing weakness of the heart and kidneys and often gangrene of the extremities or even of the lungs.

Death is most likely from the twelfth to fourteenth day, this period being also characterised by terrifying dreams. A crisis usually occurs about the fourteenth day, with the temperature rapidly falling to sub-normal levels. The patient is not yet out of danger due to the possibility of cardiac failure and convalescence is prolonged.

The disease is rarely serious in well-fed young children, but increases in severity with age and with declining standards of nutrition. Before the advent of antibiotics about half of middle aged victims died and the recovery of those over sixty-five was rare.

Although the lice acquire the micro-organisms when they feed on infected blood, typhus is not passed on by the bites of the insects but always by the faeces. The rickettsiae from the blood meal enter the cells of the mid-gut epithelium of the louse and there multiply exceedingly. The cells first distend and then burst, liberating enormous numbers of rickettsiae back into the lumen of the gut. Louse faeces are produced as a paste which rapidly dries to a fine black powder. If the faeces contain rickettsiae they can remain infective for up to one hundred days, long after the lice which produced them have died.

Adult lice no longer have the ability to repair the damaged mid-gut epithelium, for cell division has permanently ceased in this tissue. The progressive killing of cells by the rickettsiae weakens the gut until a burst occurs. The red blood from the gut now mixes with the insect’s own colourless blood, turning the whole creature a distinct shade of red. This provides a sign useful in the early diagnosis of typhus, before the characteristic rash appears. An occasional rupture of the gut happens amongst any louse population, but a high proportion of red adult lice on a febrile patient is an indication of typhus. Such lice inevitably die in a day or two.

A patient who has recovered from typhus has a considerable degree of immunity. Second attacks are known, but are unusual and mild. However, anyone who has had the disease may harbour the rickettsiae in their bodies for the rest of their lives. In general this is not dangerous to the persons themselves or to others, but there are occasions when the dormant disease reasserts itself and becomes again both active and infectious. The recrudescent typhus, named Brill-Zinsser disease, typically occurs when a person who has had typhus in their youth suffers an intense emotional shock in later life, often the loss of a marriage partner. Recrudescent typhus has been termed bereavement fever. Thus it is not possible to be sure that typhus has been eliminated from a community until there is no one left alive who has ever had it.

Typhus is very much an epidemic disease, disappearing from any area at some times, only to return later. The highest risk of an epidemic occurs in winter and spring, when clothing louse populations are highest. The biggest recent European epidemic was in 1917–23, largely in the East of the continent, with thirty million cases and three million deaths. A wave of typhus swept Europe in 1933–34, particularly severe in Spain and Portugal, and there were outbreaks in 1943–46. An outbreak in Naples in 1943 was halted by the use of DDT, the first time this substance was used on a large scale. At the present time the major foci of active typhus are in the mountainous areas of North-East Africa, following political unrest, wars and famine in this area, and also in the high mountain villages of the Andes.

Murine typhus, also called endemic or flea-borne typhus, is also caused by a rickettsia, this time R. mooseri. The course of the disease is similar to that of classical typhus, but it is much milder and there are fewer deaths. The disease differs from typhus in that it is a zoonosis, an infection primarily of rats, especially of the brown rat, Rattus norvegicus. The transmission from rat to rat may be effected either by the Anopluran louse Polyplax spinulosa, a parasite of the rats, or by the house mouse flea Leptopsylla segnis, which readily bites rats. Transmission to man is by any of the rodent fleas which also visit man, the plague flea Xenopsylla cheopis being most often involved, but transmission is not via the bite of the flea but is again by the contamination of broken skin by flea faeces. Transfer from man to man occurs through the activities of human lice in a similar manner to classical typhus. Murine typhus tends to be an urban disease, and is at present most common in North America (especially along the Atlantic seaboard), in Mexico, in the Indian sub-continent and also in South-East Asia.

The third rickettsial disease associated with human lice is trench fever. Caused by Rickettsia quintana, the condition is painful and debilitating, but fatalities are almost unknown. The epidemiology and course of the disease are reminiscent of typhus itself, but shorter in duration. R. quintana does not multiply in the epithelial cells of the louse gut, but in the lumen, almost the only rickettsia known which does not enter an arthropod cell at some stage in its life history. Because many lice are infected with a non-pathogenic rickettsia, R. pediculi, which also does not enter the insects’ cells, it has been suggested that trench fever might be a recurring mutation of this. Consequently there is an absence of red lice, a point of distinction from early typhus. Trench fever caused major problems in the first world war, and minor difficulties in the second, but has hardly been seen since. Once again, the faeces are the route of transmission, not the bite, and as with all the rickettsial diseases carried by lice it is not necessary to be lousy oneself to catch the disease.

All three louse-borne rickettsial diseases are transmitted equally well by all three types of human lice in the laboratory, but in the field it is the clothing louse which is of overwhelming importance. Partly this is because in epidemic
situations, clothing lice are generally present in much larger numbers than are the other two, but also because their faeces are more likely to be trapped by clothing and bedding, allowing a build-up of dangerous material.

Our last louse-associated disease of man, and a very major one, is louse-borne relapsing fever. This name is preferable to its alternative, European relapsing fever, because the disease is of cosmopolitan occurrence. It differs in several important ways from the other diseases carried by lice. The causative agent is not a rickettsia but a spirochaete, *Borrelia recurrentis*, an elongate spiral micro-organism which swims actively in the blood, its length being approximately that of the circumference of a red blood cell.

The designation “louse-borne” distinguishes this relapsing fever from a clinically similar condition caused by another spirochaete, *Borrelia duttoni*. However, that disease is tick-borne and strikingly different in its epidemiology. Henceforth the term “relapsing fever” refers only to the louse-borne form.

The micro-organism invades man through the skin. It may enter through a minor wound, but can also penetrate intact skin. A short incubation period follows, usually less than one week, during which the spirochaetes multiply in the blood by longitudinal binary fission. Their metabolites are toxic, causing damage to liver functions in particular. The onset of symptoms is sudden. A high fever is present but the patient usually becomes apathetic rather than delirious. A rash develops by bleeding into the skin and jaundice is common. In about six days the fever subsides and a degree of recovery appears to occur, but in about six days more the patient usually relapses into a second attack. Some people later suffer a third or even a fourth episode, but these are milder than the first. In fatal cases, death usually occurs at the end of the first attack by failure of the liver or of the heart, or by gross vascular damage. Without medical care about one in fifteen of those infected with the disease will die.

Lice become infected by the ingestion of the blood of persons who are in the active phase of the disease. The spirochaetes then pass through the mid-gut wall of the insects, carefully threading their way between the cells, and enter the blood of the lice. Here they multiply slowly, but seem to do the insects no harm. They cannot again leave the living louse and transmission depends on the louse being crushed, a frequent fate, whereupon the micro-organisms will penetrate the skin from the shed blood of the insect. Naturally the disease cannot be passed to a second person unless the louse has first also passed to him, so that, in contrast, distinction from louse-borne rickettsial diseases, it is necessary to be lousy in order to acquire relapsing fever. Neither the bites nor the faeces of lice transmit the disease; only their blood is infective.

Head lice, clothing lice and crab lice all spread relapsing fever equally effectively, the comparative importance of clothing lice lying only in their relative abundance in the impoverished communities most at risk. Louse-borne relapsing fever is a cosmopolitan disease but is at present causing most concern in the Ethiopian region. In the world in general, and in Africa in particular, it is said to be increasing in incidence.

The third louse of man, *Pthirus pubis*, is unimportant in disease transmission, but has other ways of causing distress. The very name causes some distress to many entomologists, for it is an example of a fossilised misprint! In the first accepted scientific description of the species, the generic name was intended to be *Phthirus*, but was mis-printed *Pthirus*. Even though the author himself repudiated the mistake by continuing to use the name in its original form, it was the mis-print which was confirmed as the official name by the International Commission on Zoological Nomenclature. Older medical literature sometimes uses the form *Pthirus*, often with the specific name *inguinalis*, but both of these are invalid.

Because of their squat form and enormous claws, these insects are often called crab lice, which is to be preferred to them being called pubic lice, for they are by no means confined to the pubic hair, although admittedly that is one of their most characteristic sites. Crab lice may be found on under-arm hair and on hairy legs and chests. They are the louse of the beard and also the eye lashes. (The louse
of the eye brows is the head louse.) About 1% of the louse infections of head prove to be *Pthirus*, not *Pediculus*. Such cases are most common in red-headed people, who, having fewer head hairs per unit area than other people, consequently have them more widely spaced. This suits the crab louse, for it is hair spacing and hair diameter which determine the sites of predilection of both the head louse and the crab louse. Coarse, widely-spaced hair is preferred by the crab louse, and its claws are clearly adapted to grasp this.

The life cycle is not in general dissimilar to that of head lice, although it is only in exposed hair, such as the beard, that it is possible to make an estimate of the duration of the infection by studying the position of the nits. When under warm clothing, the lice do not necessarily lay eggs against the skin. In addition, the females only need to mate once in order to be fertile for life, and the sexes are numerically equal.

So great was the prudery surrounding this insect until very recently that it has been difficult for scientists to choose to work with it, and in consequence important aspects of its biology are unknown. It must certainly be the least studied insect regularly to bite man.

*Pthirus* is a sedate and slow moving louse. Each tends to sit quietly at the base of a hair, feeding from time to time, but without ever bothering to remove its mouthparts from the skin, except to mate, to moult or to lay an egg. In consequence much of a louse's saliva tends to be injected into the same place, which sometimes results in a blue spot developing in the skin, centred on the biting point. These *maeckae ceruleae*, although spectacular when present, are really much rarer than textbooks imply and are caused by an enzyme being present in the saliva which converts the haem of haemoglobin into biliverdin, a blue-green bile pigment.

As with all lice, *Pthirus* is spread by contact, usually, but by no means invariably, a sexual one. When it is discovered, most people greatly underestimate the duration of their infection. They tend to blame some public lavatory used two or three days before, when really it was some close encounter, intimate or innocent, three or four months before which was to blame. Viable lice do not leave their hosts, so any lice which are found in beds, in baths or in lavatories are once again dying, dead or merely cast skins. The sexual connotations of this louse have been exaggerated; they are best regarded as the general louse of coarse body hair, for numerous quite innocent bodily contacts are potentially capable of transferring them, to the distress of the recipients.

Even so, when every allowance is made for alternative methods of transmission, it is still true that catching crabs is usually done in double beds. This explains their curious distribution, for they are noticeably more common on good looking people, on intelligent people and on affluent people. Unfair as it might seem to the ugly, the stupid or the poor, some people do find it easier than others to stray from the paths of virtue, should they wish to do so!

When they are discovered, these lice are almost never taken to a doctor, for doctors are respected figures. Self treatment is the rule, but unfortunately home remedies produce their own problems, for some are no better than old wives' tales, while others are downright dangerous. Even those people who have reason to fear that they also caught one of the more serious sexually transmitted diseases, often will not go to a clinic until they are free of their lice, being more ashamed of the lice than of any STD. In fact, most sufferers eventually go to chemists' shops, not for advice, but for cat-flea powders and similar products. This avoidance of doctors has caused some of them to believe and record that phthisis is rare. This is not so, for in developed countries at least, it may well be that it is this louse which is most common of the three. The fact that the insect can hardly be mentioned in polite society works very much to its advantage, for this ensures that virtually no education concerning it can be given, thus conferring the ultimate in protective camouflage: social invisibility.

The possession of any of the human lice constitutes a disease, for what else is a recognisable syndrome caused by a specific infective agent? People do not merely have lice, they also suffer from them. The conditions caused by lice are respectively known as *pediculus corporis*, *pediculus capititis* and phthiriasis. (The term *pediculus pubis* is often used, and phthiriasis is the spelling for those who feel that medical nomenclature should not be governed by mis-prints).

Of the three, *pediculus corporis* is the most severe. The condition is not caused by any disease which the lice themselves are carrying, but is simply caused by the possession of enough lice. An infection usually begins with only a few insects, but can build up into a population of hundreds, sometimes even thousands. Since each louse feeds four or five times a day, it is not unusual for a louse person to suffer more than a thousand insect bites each and every day: by no means trivial matter. Into each bite wound the louse injects a relatively large volume of saliva, containing anti-coagulants and other biologically active proteins, including enzymes and red-cell clumping agents. Thus, in total, a significant quantity of foreign protein is regularly injected and against this the body eventually reacts.

In most cases a local sensitisation develops some three to four weeks after infection with lice, which until this point are symptomless. An irritation at the site of biting occurs, enough to disturb sleep. Scratching may lead to secondary infection with bacteria, and heavily bitten areas of skin may eventually become permanently hardened and darkened, this complication being termed *morbus errorum*, or vagabonds' disease.

About eight to twelve months after first infection with lice, but less after subsequent infections, a more general reaction sets in. A slight temperature develops and muscular aches and pains occur, especially in the feet and legs. A rash resembling German measles may appear for a while. A heavy, dull, lethargic frame of mind develops. The sufferer becomes apathetic and sullen if left alone, and irritable is roused. Such a person is not well, if fact he feels lousy, presumably the origin of the phrase. Long term louse sufferers sometimes become allergic to the insects' faeces and develop a condition similar to hay-fever. (This is a particular hazard for laboratory staff working with lice.)

In the case of head lice, a neglected infection will eventually reach a steady state where the death rate equals the birth rate. At this stage there are usually some two
hundred lice present, of all post-ovum stages. Most will be young insects and there will be no more than twenty to twenty-five adult females present, but those few must lay about five thousand eggs each month in order to maintain the steady state. The head eventually becomes grey with drifts of empty eggshells.

If this number of lice are present for some months, they are enough to produce the symptoms of *pediculosis capitis*. The child becomes itchy, tired, dull and sulen. The bright child becomes average and the average child stupid. In older times it was believed that lice grew best on dull children, but now we know that children with lice eventually become dull. A child having an educational handicap because of lice is known as a nit-wit. Of course it is rare for British children to be allowed to become thus affected, so the great majority of cases are trivial, but it is as well to remind ourselves that this is what we are preventing by prompt and effective control of head lice.

Pthiriasi rarely develops past the stage of skin irritation, for usually insufficient insects are present to induce the more general physical effects, although psychological distress is common.

All three human lice are also often associated with the curious condition of delusory parasitosis. Sufferers firmly believe that they are infected with lice when they are not. The condition may be found in people who have a pre-existing morbid fear of insects, or may follow from a genuine infection with lice that has been cured. Nothing will convince these people that they do not have lice. They often make their own lives a misery by trailing from doctor to doctor, never believing any assurance. The fact that no lice can be found is put down to ignorance, or even the wickedness, of the medical profession, or to the lice being under, instead of on, the skin, or to them being invisible. Psychiatric help is essential.

It is entirely natural for all of us to dislike the idea of insects crawling around on our bodies, but in all too many people this natural squeamishness is expanded into entomophobia, an irrational fear of insects. Even within the medical and nursing professions lice are sometimes perceived as being much more dreadful and disgusting than they really are. This attitude can hamper the provision of logical treatment programmes and effective training schemes for those involved in louse control, because entomophobic people who happen to be in positions of authority will first try to ignore lice, not wishing to even think about them, and then, when forced to take action, will often over-react in illogical manner. The underlying emotion is fear, often accompanied by tenaciously held views and opinions having little to do with scientific detachment or respect for fact. Influenced by their attitudes to these parasites, even kindly and intelligent people can act in surprisingly illogical or even cruel fashion without being aware of their own motivations.

There is a tendency in most of us to regard even the head lice of a child as being in some way deserved, an almost instinctive feeling that if only the child had led a better life, he would not be so afflicted. This needs guarding against, for if such a condition is to be regarded as a social offence, rather than a disease, there may well be a further feeling that treatment ought to contain a punitive element.

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**Fig. 14** A clearing notice. An example of a notice issued under Section 54(2) of the Education Act (1944). Failure to comply may lead to legal proceedings against the parents. Nowadays this notice is only used against head lice; the only childhood ailment thought of as unclean. 15,403 such notices were issued in England alone in 1980.
before “forgiveness” can properly be given. Perhaps this is why medicated shampoos are so universally insisted on, even though they are obviously a rather poor way of applying insecticide to head lice. Children with head lice are regarded as being in some way ritually unclean, and are, indeed, often referred to as being “dirty”, no matter how physically clean. The shampoo is apparently used as much to remove a ritual taboo as to remove the lice. Otherwise, who but an idiot would wish to wash an insecticide off an insect before it is dead?

Likewise, the advocates of compulsory hair cutting, and of all other treatments which make the child conspicuous in any way, should beware of this desire to humiliate and punish the lousy, for it is very insidious and present in the nicest of people. To take a further example: infection with head lice constitutes the only childhood ailment which is actually illegal in Britain. A recidivist lousy child may be the subject of a Cleansing Order under various Acts of Parliament, whereby, having been removed from his home in the presence of a uniformed police officer and taken to an authorised place of cleansing, treatment may be duly executed upon him. His parents may be fined. This procedure is not a thing of the past. (Oddly and illogically, the middle class child’s infection is regarded as a most unfortunate accident, his parents are consoled with, and he himself is treated with privacy, usually in his own home.)

Our willingness to ignore the clothing louse is compounded by our willingness to ignore its victims, who are generally impoverished, inadequate and unlovely. Because of our fear of lice it is difficult for us to regard the lousy man as ill, for this clashes with our instinctive feeling that in some way he deserves to be lousy. Such a person is utterly isolated, for not even another vagrant will come into contact with him, and as for respectable people, only another St Francis could give the lousy a friendly hug.

The punitive element is strong in many treatment procedures. There are shining exceptions, but in general disinfection centres are very grim places, staffed by unqualified attendants acting more as warders than as nurses. This is not the proper treatment of patients with a disease, nor is it even effective, for such is the humiliation involved that many lousy people prefer to keep their lice as long as possible.

On the brighter side, there is an increasing awareness that the standard of training of those concerned with louse control can be raised, and this is so right across the spectrum of those involved. Doctors, nurses, parents, teachers, clinic staff, health educators and environmental health officers are now more aware than ever that there is much more that they could usefully know about lice.

This increasing realisation of the desirability of better training is not just confined to Britain. In particular many developing countries are realising that to take the step across the dividing line into being a developed country involves a change in the way their peoples regard themselves. A high degree of lousiness is incompatible with the increased morale necessary for a nation’s advancement.

Fig. 15 A cleansing order. An example of an order issued under Section 54(3) of the Education Act (1944). Failure to comply may ultimately lead to the child’s detention by a uniformed police officer for compulsory delousing. The parents may be fined. Repeated lousiness is the only childhood ailment which can be classified as illegal in Britain. 1,506 such orders were issued in England alone in 1980.