

THE BEDBUG, *CIMEX LECTULARIUS*^a LINNAEUS.

Pt. II^b. Critical remarks on its literature, with a history and bibliography of pathogenic relations.

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A full bibliography of this insect, as promised in Part I of this paper, had to be abandoned because of its length. In contemplating its publication, the writer had in mind, mostly, its hoped for usefulness to both entomologists and medical men.

^bPart I, Psyche XII, 1905 pp. 61-74.

Such a common, and persistently obnoxious insect must necessarily have a very extensive literature, and one that is much scattered, especially since it is a factor directly affecting the social communities of man himself.

In reviewing this body of literature, the writer has been continually impressed by one fact in particular, namely, that in the economic discussion of the bedbug by entomologists, the latter show almost an entire lack of knowledge of its medical literature; and so, conversely, the medical profession in discussing its hygienic, pathological or sanitary relation to man, quite often show great deficiency in their knowledge of its entomological literature. This has, therefore, led to many misleading, erroneous, and loose statements concerning the habits of the pest, made especially, however, in the medical literature and in the writings of zoologists and naturalists. These classes of writings have been found, in nearly all cases, to have been compiled from various unknown sources, both good and bad; the statement of course excepts the literature of experimental medicine. In the latter class of writings, the only fault to be found is the continual use of local or common names instead of the scientific one, such as, for instance, *bug* by the English, *wanze* by the Germans, *punaïse* by the French, and so on. This use of vernacular names has thrown doubt on the value of the experiments performed, for the reason that they are entirely too general in their application.

Another point which has very forcibly struck the writer, is the great disproportion between the literature of this insect *en masse*, and the *real* facts now

^aBy request, Dr. Ch. Wardell Stiles has carefully studied the synonymy of this insect, and has decided that *lectularius* is the type of *Cimex* Linnaeus. The insect will therefore retain its original name. *Acanthia*, *Klimophilos*, and *Clinoris* are rejected. Dr. Stiles' note will appear in Proc. Ent. Soc. Washington, VIII, 1906, probably in June of the present year.

known concerning its habits and life history.

The great majority of the accounts are simply re-compilations and appear to have no other purpose than to cover so much space in as rapid a manner as possible, as if the discussion of the bedbug was simply a matter of course, or of duty; to some it actually appeared to be distasteful, doubtless through false modesty. The addition of new facts was exceptional; unfounded statements, however, the rule. So that, taking the whole body of literature, we know more about the bedbug, *theoretically* than we do *actually*, a seeming paradox. The accounts by Southall (1730), De Bomare (1764), DeGeer (1773), Jördens (1801) and Curtis (1835) were good authorities even up to the last two decades, as late as 1890. Southall was probably the source of them all.

A state of affairs of this kind in the history of any insect, especially an important insect, should not be. It is true, that the majority of the accounts published on the bedbug were meant for the information of the general public, and were written in a popular way, but that fact does not excuse the carelessness with which they were compiled, especially since they were written by scientific men. In the remainder of the accounts, which were published as contributions to the knowledge of science, it would at least be expected to find something that really contributed, that were new facts.

In contrast to the great majority of writings on *lectularius*, however, the literature concerning its pathogenic relations is more careful in statement, and less obscure in meaning. This is to be expected from its nature, because experimental evidence is generally presented in the form of a clear statement of facts. But, notwithstanding this, nearly every paper which has been consulted, lacked one essential thing,—the scientific name of the insect in question. Until the species of insect with which experiments are being performed, is definitely known, uncertainty will always attend the results. This is especially true in the case of the bedbug and its near relatives, as just recently pointed out (Girault and Strauss, 1905). Unless the Latin name of the insect was given in the articles on the pathogenic relations, the conclusions drawn from the experiments recorded were always accompanied with doubt as to whether *lectularius*, *columbarius* Jenyns, or one of the other allied species were meant. Any one of the allied species would probably have behaved toward the small mammals used as hosts, as recorded in the experiments. Hence, the confusion.

As the writer has already given several practical illustrations of the poor character of some of the literature of this insect in part I of this paper

pp. 61, 72-74) and in a recent paper on host relations just mentioned (Girault and Strauss, 1905), and as he hopes to present elsewhere an abstracted bibliography of the whole, he considers it unnecessary to go into the subject deeper. Suffice it to say, that the few brief criticisms made on the literature of the bedbug, showing as it does needless repetition and speculation, should serve to warn us, in a measure, to be more careful in compiling accounts of our common economic insects, and furthermore, should urge us to make at least some effort to add new facts.

On account of the interest now being shown in the rôle of various insects in the transmission of diseases, and in order to attract the attention of entomologists to the bedbug's rôle in transmission, a brief history of its pathogenic relations follows.

In 1887, the famous Metschnikoff, in an article on certain phases of relapsing fever published in a well-known medical journal of Berlin, made general references to the bedbug as a carrier of diseases. This is believed to be the first time that the idea was definitely mentioned, and Metschnikoff may be held to be the originator of it.

A period of about five years then elapsed before anything more was said about the question, when in 1892 a Dr. Dewèvre published in Paris an account of a supposed case of the transmission of tuberculosis, which he discussed at length, and tried to establish. His evidence was quite insufficient, and the whole case did no more than to throw grave suspicions on the bedbug. This article was reprinted in the *Medical Record* of New York, and in the year following it was reviewed in *Insect Life*, a periodical published by the then Division of Entomology, U. S. Department of Agriculture, and in the *American Monthly Microscopical Journal* of Washington. Since then the case has been quoted and reviewed from time to time in medical journals and general treatises on medicine. It was founded on suspicious circumstances only.

In 1895, M. Morau, a Frenchman, published in the *Revue Scientifique* of Paris, an article on the contagiousness of cancer, in which he tried to establish, by means of experiments, that bedbugs carried the causative agent of that disease. The experiments were entirely negative.

Two years later, articles ascribing to the bedbug means of spreading diseases became more or less common. Dr. George H. F. Nuttall, formerly of Johns Hopkins University, Baltimore, then began his series of important experiments on the rôle of insects in the spread of diseases, which were continued over

several years and then, in the year 1900, summarized, together with a critical and historical study of the whole question. The possibility of the transmission of relapsing fever by bedbugs was considered by a Dr. Tictin, with negative experiments, while a Japanese writer, M. Yamagiwa, stated definitely that out of a large number of clinic cases of bubonic plague, one case was caused by the bite of a bedbug.

In the following year, 1898, Dr. Charles F. Craig, then Acting Assistant Surgeon, U. S. Army, quoted the cases of Tictin and Morau, and called attention to the lack of knowledge of the question involved. Experiments on the transmission of anthrax by bedbugs were recorded by M. Joly, with negative results while one of his fellow-country men, Dr. Simond of the Pasteur Institute, stated in a lengthy article on bubonic plague, that the flea and the bedbug were the two "parasites", *a priori*, which were able to assume a role in the transmission of that dangerous disease. He thought it probable that the bedbug intervened in the transmission of that disease from man to man.

During 1899, M. M. Calmette and Salembeni, in the annals of the Pasteur Institute, wrote of a case of bubonic plague in which the bedbug's bite formed a starting point of the disease. During the same year, Dr. Carmichael, of the U. S. Marine-Hospital Service, said,—“It is suspected that certain insects play a part in the transmission of leprosy, the common housefly, mosquito, and bedbug being the principal carriers of infection.” In 1899, Dr. Coplin, of the Jefferson Medical College, Pennsylvania, proved that pure cultures could be inoculated from infected bugs; the infections were those of typhoid fever. After discussing the parts played by household insects in spreading certain diseases, he concludes by saying, “The danger from the bedbug and roach would probably be great in diphtheria and all would share in the possible dissemination of tuberculosis, anthrax, and similar bacterial diseases.” But conclusions opposite to this were reached by Muhling in a paper published at Jena about the same time. He concluded that of themselves, bedbugs could not carry contagions, but that their bites would naturally form a *porte d'entrées* for pathogenic bacteria.

With the exception of minor articles, the only other important writing which has been published on bedbugs and their relations to human diseases is that of Dr. Nuttall, mentioned in foregoing. This was first published at Berlin, in 1899, and reprinted the following year in the *Johns Hopkins Hospital Reports*. (Nuttall, 1900.) It critically discussed all the experimental evidence then

recorded concerning the transmission by bedbugs of anthrax, bubonic plague mouse-septicemia, chicken-choleia, *Bacillus septicus*, relapsing fever, and tuberculosis. Nuttall concluded that nothing had been positively proven, and his conclusion holds up to the present time.

*BIBLIOGRAPHY OF THE PATHOGENIC RELATIONS OF
THE BEDBUG.*

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General references to transmission of diseases by the bedbug.
- 1892 a. Dewèvre, (Docteur). Note sur le role des pediculi dans a propagation de l'impétigo. Comptes rendus hebdomadaires des séances et mémoires de la Soc. de biologie. Paris, tome quatrième, neuvième série: pp. 232-234.
From Nuttall (1899), p. 32. The reference is evidently a wrong one; tuberculosis and the bedbug are not mentioned.
- 1892 b. Dewèvre, (Docteur). Note sur la transmissibilité de la tuberculose par la punaise des lits. Revue de médecine, Paris, XII, pp. 291-294.
Account of a case of supposed transmissison, with discussion. "La punaise des lits peut donc jouer quelquefois un rôle assez important dans la propagation de la tuberculose, et nous estimons qu' à l'avenir l'hygiène devra tenir compte de ce facteur nouveau en édictant les règles minutieuses de la désinfection." P. 294.
1892. Editors. Bedbugs—. Medical Record, New York XLII, p. 347. Brief summary of Dewèvre (1892 b). Cf. Riley and Howard (1893).
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(Quote Editors (1892).
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XV, pp. 295-296.

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1895. Morau, Henry. Le cancer est contagieux. *Revue scientifique*, Paris, LV, (III, séries 4), pp. 42-43.
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1897. Marpmann, G. Ueber den zusammenhang von pathogenen bakterien mit fliegen. *Centralblatt f. bakteriologie, parasitenkunde und infektionskrankheiten*, Jena, Bd. XXII, erste abteilung, pp. 127-132.
Includes theories concerning the relation of bedbugs to pathogenic bacteria of animals and man. Vide Nuttall (1899) p. 23.
1897. Nuttall, George H. F. Zur aufklärung der rolle, welche die insekten bei der verbreitung der pest spielen.—Ueber die empfindlichkeit verschiedener tiere für dieselbe. Eine experimentelle studie. *Centralblatt f. bakteriologie, parasitenkunde und infektionskrankheiten*, Jena, Bd. XXII, erste abteilung, pp. 91-93, (Versuche mit Wanzen).
Inoculation experiments with *wanzen*, using as hosts small mammals. For general review, vide Nuttall (1900).
1897. Tictin, J. Zur lehre von ruckfalltyphus. *Centralblatt f. bakteriologie parasitenkunde und infektionskrankheiten*, Jena, Bd. XXI, erste abteilung, pp. 181, 182-186.
"Ueber die Möglichkeit der Uebertragung Ruckfalltyphus durch Wanzen". Relation of bedbugs to "*Febris Recurrens*", with negative experiments.

1897. Yamagiwa, K. Ueber die Bubonenpest. Archiv f. pathologisches anatomie und physiologie, und f. klinisches medicin. Herausgegeben von Rudolf Virchow (Virchow's Archiv), Berlin, Bd. 149, supplementheft, p. 109.
 "Ausserdem habe ich bei einem Patienten (Fall LII) in dem Granulationsgewebe des vor der Erkrankung durch dem stich einer Bettwanze entstandenen Gescwurs am linken Unterschenkel, auf * * * * *."
1898. Craig, Charles F. The transmission of disease by certain insects: ticks, bedbugs, ants, etc. Bedbugs and the transmission of disease. New York Medical Journal, New York, LXVIII, pp. 598-599, figs. 3-4. Quotes Westwood (1840) and Uhler (1884), and gives the substance of the experiments of Titkin (Tictin, 1897) and Morau (1895); figures from Osborn (1896). Lack of knowledge of the question involved.
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 "* * * par certaines particularités de la transmission du rat à l'homme et d'homme à homme; pour ce dernier cas, il est possible que d'autres parasites, enparticulier punaise, interviennent; * * * * *". P. 687.
1899. Abbott, Samuel W. Public hygiene and preventive medicine. The

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1899. Carmichael, D. A. Leprosy in the Hawaiian Islands. The Medical News, New York, LXXIV, p. 95.

Abstract from Public Health Reports, to Supervising Surgeon-General, U. S. Marine-Hospital Service, Dec. 30, 1898.

"It is suspected that certain insects play a part in the transmission of leprosy, the common house fly, mosquito, and bedbug being the principal carriers of the infection."

1899. Coplin, William M. Late. The propagation of diseases by means of insects, with special consideration of the common domestic types. Philadelphia med. journal, Philadelphia III, pp. 1303-1307, 6 text-figs.

Address delivered before the Pennsylvania State Medical Society, Johnstown, Pennsylvania, May 17, 1899.

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"The danger from the bedbug and roach would probably be great in diphtheria, and all would share in the possible dissemination of tuberculosis, anthrax, and similar bacterial diseases." p. 1306.

1899. Mühling, Paul. Die uebertragung von krankheitserregern durch wanze und blutegel. Centralblatt f. bakteriologie, parasitenkunde and infectionskrankheiten, Jena, Bd. XXV, erste abteilung, pp. 703-706.

Original experiments with bedbugs. "Aus allen diesen Thatsachen ergibt sich also sicher; dass der Wanzenstich an sich nichts zu bedeuten

hat, abgesehen natürlich von der dadurch gesetzten Hautlasion, welche später eine porte d'entrée für Bakterien sein kann, dass er aber durch Zerquetschen und Zerreiben des Blutsaugers an der gestochenen Stelle gefährlich werden kann insofern, als Mikroorganismen in den Stichkanal eindringen, welche oberflächlich der Wanze anhaften oder in Därme derselben enthalten sind." p. 705.

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Digest of Nuttall (1899) and Coplin (1899); no proof of the conveyance of tuberculosis has been furnished.



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