

**A MAP SHOWING THE KNOWN
DISTRIBUTION IN ENGLAND AND
WALES OF THE ANOPHELINE
MOSQUITOES, WITH
EXPLANATORY TEXT AND NOTES**

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A Map Showing the Known Distribution in England and Wales of the Anopheline mosquitoes,
with explanatory text and notes by William Dickson Lang

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WILLIAM DICKSON LANG

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A MAP SHOWING THE KNOWN
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BY

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PREFACE.

THE Anopheline group of mosquitoes is made up of several distinct species, some found in one part of the world and some in another. It is the group to which all those particular species of mosquito belong which are known to act as carriers of malaria.

When one of these mosquitoes bites a malaria patient, it sucks in with the blood of the patient some of the parasitic organisms to whose presence in the blood the malaria is due; these parasites reproduce and multiply within the body of the mosquito, eventually make their way into its salivary glands, and thence can be injected into the blood of the next person bitten by the insect.

Three species of *Anopheles* are indigenous in Britain, two of which, namely *A. maculipennis* Meig. and *A. bifurcatus* L., are known to be malaria carriers. *A. maculipennis* is the species that is most active in the spread of malaria in Southern Europe.

The object of the present map, and of the text written to accompany it, is to show what is known of the distribution of those three species of Anopheline mosquitoes in England and Wales.

Such knowledge becomes of very great importance at the present time, owing to the fact that there are now a great many infected soldiers in this country who have been brought in from overseas, and who constitute a source from which malaria may be spread by the agency of the mosquitoes.

Mr. W. D. Lang, to whom the preparation of the map has been entrusted, has devoted much time to the work, and has endeavoured to do his best with the means within his reach. But it is obvious that no map of the kind could be made anything like complete or final, except after a prolonged and very careful search for the species over the entire area which it covers.

There are many parts shown blank on the map, where no such search has ever been undertaken, and where investigation is at the present time desirable. On the other hand, there are some large districts in which a great deal in that direction has already been accomplished, especially through the action of the medical authorities of the Local Government Board and of the War Office.

For the assistance thus obtained in making the map more complete, the thanks of the Trustees are due, as well as for the assistance received from various other sources acknowledged by Mr. Lang at page 6.

Here may be specially mentioned the valuable help which has been derived from the map and records published by Prof. G. H. F. Nuttall and others in the *Journal of Hygiene* for 1901. Prof. Nuttall's map has, in fact, served to a great extent as the model upon which the present one is based.

Although the map, for the reason stated, may not give an altogether true idea of the distribution of *Anopheles* in England and Wales, Mr. Lang has, I think, succeeded in making it give as complete and true an idea as the present state of knowledge on the subject will allow.

CHARLES J. GAHAN,
Keeper of Entomology.

BRITISH MUSEUM (NATURAL HISTORY),
June, 1918.

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A MAP OF ENGLAND AND WALES SHOWING THE LOCALITIES WHENCE ANOPHELES— THE MALARIA-BEARING GENUS OF MOS- QUITO—HAS BEEN OBTAINED.

THE accompanying map shows in what parts of England and Wales mosquitoes of the genus *Anopheles* have up to now been found. But it should be noted that neither with regard to range, nor to the frequency of occurrence, is the true distribution directly shown on the map. As to its range, *Anopheles* is likely to be found in suitable stations all over England and Wales; and, as to its frequency, it is probably most abundant in the lower reaches of the larger rivers and in low-lying tracts of marshy ground. And, though the map may corroborate these two points, yet it more obviously shows the districts where *Anopheles* has been most keenly sought; and this point should be borne in mind before deductions are drawn from the map as to the distribution of *Anopheles*.

Localities where *Anopheles* has been obtained are indicated on the map by numbers surrounded with either a red ring, a blue V, a black triangle or a red rectangle. In many cases it has not been possible to determine the species of *Anopheles* recorded from a given locality, though it is more probable than not that the species is *A. maculipennis* Meigen, and the numbers indicating such localities are placed within a red rectangle; the majority of the numbers are surrounded by a red ring, and these mark the localities where *A. maculipennis* Meigen has been obtained; *A. bifurcatus* (Linnaeus) is recorded from the places whose numbers are enclosed in a blue V; while the occasional black triangles surround numbers indicating localities for *A. plumbeus* Stephens.

The numbers refer to the localities given in the following list. In this list the localities for *A. maculipennis* are taken first, and arranged alphabetically, primarily according to the counties in which they lie, and secondarily according to the place-names themselves; next, localities for *A. bifurcatus* are similarly dealt with; then those for *A. plumbeus*; and, finally, the localities for *Anopheles* of undetermined species. Besides the locality, the particulars of each record are given, and, in some cases, notes and general observations accompanying the records. The last are often of great interest, and make it possible to construct to some extent the life-history of the species concerned. For the sake of completeness Scotch and Irish records have been added in each case after those from Wales.

Following the list of localities are some practical notes on how to distinguish (a) a true Gnat (= Mosquito) from other flies; (b) a British Anopheline mosquito (that is, a British species of *Anopheles*, which genus alone conveys malaria) from a Culicine mosquito (that is, a non-malarial gnat); and (c) the three British species of *Anopheles*. There is also added a brief *résumé* of what is known of the life-history of each species.

The sources whence the information given in the text is drawn are comparatively few. Some of the records have already been published, and full reference to these publications is given, except in the frequent allusions

to (1) F. W. Theobald—A Monograph of the Culicidae or Mosquitoes, vol. i, 1901, and vol. v, 1910, and referred to as *T. 1901*, and *T. 1910*, respectively; (2) G. H. F. Nuttall, L. Cobbett and T. Strangeways-Pigg, Studies in Relation to Malaria, I, Journal of Hygiene, vol. i, 1901, pp. 1-44, and referred to as *N. 1901*; (3) G. H. F. Nuttall, note on the prevalence of *Anopheles*, Journal of Hygiene, vol. v., 1905, pp. 485-7, and referred to as *N. 1905*.

Other records, hitherto unpublished, have been obtained from the following sources:—

(1) Col. Sir Ronald Ross, F.R.S., through Capt. F. W. O'Connor, R.A.M.C., has kindly supplied information as to the distribution of *Anopheles* on both sides of the mouth of the Thames, from Sandwich and the neighbourhood of Romney Marshes. Such records obtained through the War Office are acknowledged in the text by the initials *W. O.*

(2) The Local Government Board has kindly co-operated in the production of the map, first by asking the Medical Officers of Health in the various districts to send to the Museum any mosquitoes they may collect. In this way many records have been obtained, and particularly from south-eastern Essex, in which district, owing to the energies of Dr. J. F. Macdonald, *Anopheles maculipennis* has been sent from approximately a hundred localities. Records obtained by this means are acknowledged in the text by the initials *L. G. B.*, placed after the record. Secondly, the Local Government Board, through their entomologist, Mr. A. J. Grove, have made available the records that he and others in their employ have obtained in the field. And I should like to take this opportunity of acknowledging the ever-ready help and courtesy of Mr. Grove and the trouble he has taken to supply the information in a readily available form. Such records have the initials *A. J. G., L. G. B.*, placed after them.

(3) Mr. F. V. Theobald, M.A., has been kind enough to supply a manuscript map on which are marked localities from which *Anopheles* has been recorded, together with notes giving, in many cases, particulars of the records. This information is distinguished by the initials *T's. MS.*

(4) Mr. Hugh Scott, M.A., had gathered many records from various sources with a view to compiling the map himself. When the task devolved on me, he handed me these records, and I am much indebted to him for his help and advice in introducing me to the work. In addition, he has since sent me some of his own observations as well as the records of the British species of *Anopheles* in the collection in the Cambridge University Museum. His help is acknowledged by the initials *H. S.* following the information he has supplied.

(5) At the request of Mr. A. Vassall, M.A., of Harrow School (to whom I am thus indebted for information from this source), the Secretary of the Association of Public School Science Masters circularised the various Public Schools, asking them to send to the Museum localised specimens of gnats. Records obtained by this means are marked with the initials *P. S.*

(6) Particulars relating to specimens in the British Museum Collection have been noted.

(7) Various persons, learning through channels other than those indicated that localised specimens were needed, have sent such from time to time with particulars of their occurrence. The source of such records is given in each case, and a general acknowledgment of their help is here made.

The following abbreviations also are used:—

♂ = male. ♂♂ = males.
 ♀ = female. ♀♀ = females.
 coll'd. = collected by.
 colln. = collection.

Showing whence Anopheles has been obtained. 7

det. = determined by.
det. conf. = determination confirmed by.
inf. = information received from.
obs. = observed by.
per. = by means of.
rec. = received.

Unless otherwise stated, the record refers to the imago, or fly; the earlier stages are always referred to either as larvae or pupae as the case may be.

ANOPHELES MACULIPENNIS Meigen.

Numbers on the map referring to this species are within red circles.

BEDFORDSHIRE.

1. **Bedford.** (1) On road from Sandy, 3 m. from Bedford, at 100 ft. or less; larvae in a small stream; (2) in R. Ouse at Bedford, along town promenade; in patches of algae; a few small larvae; both, 4, viii, 1900; obs. W. Mitchell. *N. 1901.* (3) *T's. MS.*
2. **Biggleswade.** Common, 1889-1892. *T's. MS.*
3. **Caldecote,** N.W. of Biggleswade. Common. *T's. MS.*
4. **Luton.** *T's. MS.*
5. **Sandy.** (1) On road to Biggleswade, at 100 ft. or less; in a ditch fed through an overflow from a small stream in which *Anopheles* was plentiful, but *Culex* absent; a few small larvae with many *Culex*-larvae; 4, viii, 1900; obs. W. Mitchell. *N. 1901.* (2) *T's. MS.*

BERKSHIRE.

6. **Abingdon.** 1 ♀; rec. 15, x, 1917; coll'd. R. H. Birt; det. W. D. L. P. S.
7. **Day's Lock,** Little Wittenham, N.W. of Wallingford. (1) At about 130 ft.; larvae plentiful in water-logged punt in weir-stream; 14, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*
8. **Hambleton Lock,** N.E. of Henley-on-Thames, Oxon. At 100 ft. or less; larvae fairly numerous among floating debris and weed, just below the lock, and on the Berks. side of the open river; 17, ix, 1900; obs. L. Cobbett. *N. 1901.*
9. **Reading.** *T's. MS.*
10. **Streatley,** W. of Goring, Oxon. At 110 ft.; a few larvae in over-shadowed ditch on mill-island, fed by river-water at flood times only; none found in backwaters, in spite of a long search; 17, ix, 1900; obs. L. Cobbett. *N. 1901.*
11. **Wargrave-on-Thames,** S. of Henley-on-Thames, Oxon. In several consecutive years swarming in a patch of willow-herb; coll'd. J. D. Copland. *British Museum Collection.*
12. **Windsor.** *T's. MS.*

BUCKINGHAMSHIRE.

13. **Bletchley.** (1) At about 200-300 ft.; imago reared from larvae found in a little grassy-margined lake containing small fishes, swans and ducks; 18, ix, 1900; obs. L. Cobbett. *N. 1901.* (2) *T's. MS.*