The Distribution of Subspecies of Ctenophthalmus agyrtes in Hungary
(Siphonaptera: Hystrichopsyllidae)

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In the greater part of Europe *Ctenophthalmus agyrtes* is one of the commonest fleas of micromammalia and can be found the year round. Nevertheless, until very recently there has been only one published record of this species from Hungary (DUDICH, 1932, p. 58 — 3 ♀ from Aggtelek). The recent records of specimens from western Hungary are included in an article on the distribution of *C. agyrtes* sspp. in neighbouring Austria (SMIT, 1966: 219, Fig. 1).

As *Ctenophthalmus agyrtes* is the classic—though still very imperfectly known—example of subspecification in fleas and as Hungary occupies an important area in the range of several of those subspecies, the material collected mainly by the junior author and his colleagues greatly increases our knowledge of the range of distribution of various forms. We are deeply indebted to Prof. Dr. B. ROSICKÝ for permitting us to use several records based on material in the extensive collection of fleas in the Parasitological Institute of the Czechoslovak Academy of Sciences, Praha.

As subspecies of *C. agyrtes* can only be satisfactorily differentiated in the male sex, the mapped distribution is based solely on male specimens. The following five subspecies occur in Hungary (Fig. 1):

* C. agyrtes agyrtes (HELLER, 1896) — Only known from Rajka (though the one male seen from there is not 100% typical; however, atypical specimens are common in the periphery of the distribution range of subspecies) and, as is obvious from the distribution map (Fig. 1), this subspecies is doubtless confined to the northermost part of the Győr-Sopron county.

* C. agyrtes bosniens WAGNER, 1930 — Except for the above-mentioned nominate subspecies, this is the only subspecies occurring in this country west of the Duna; apparently only in the south, near Baja, does *a. bosniicus* occur on the other side of the river (however, see below sub ‘‘Intergrades’’). *C. a. bosniicus* has been collected at: Baja, Bakonybél, Bakonyványa, Balatonlelle, Iharkút, Kaposmérő, Kisbalaton, Kóris-hegy, Németbánya, Óriszentpéter, Pisznie-hegy, Sáresikút, Szabadegyháza, Szalafő, Szőce, Szuadó-völgy and Tatabánya. The single male we have seen from Szuadó-völgy veers somewhat towards agyrtes serbicicus WAGNER, 1930; additional material from the Baranya county will eventually show whether or not intermediate populations occur in the southernmost parts of the country.

SMIT (1966, 1967) discussed the distribution of this subspecies and pointed out that no specimens of agyrtes have been available for study from the large area between the type locality of *a. bosniicus* (i.e. the Igman mts, just S.W. of Sarajevo, Yugoslavia) and the places marked on our Fig. 1. Although a paralectotype from the
Fig. 1. Map showing the distribution of subspecies of Clenophthalmus agyrtes in and around Hungary. A = a. agyrtes (Heller); F = a. bosnicus Wagner; G = a. peusianus Rosicky; H = a. eurous Jordan & Rothschild; K = a. kleinschmidtianus Peus; N = a. serbicus Wagner. — Explanation of letter-combinations, e.g.: GH (or HG) = two subspecies (G and H) in one locality; G—H (or H—G) = two subspecies in one locality together with intergrades; gh (or hg) = intergrades between G and H; hg-G (or G-gh) = G with intergrades between G and H in one locality. If an intergrade veers more toward e.g. G than H, this can be indicated by Gh.

The names of the localities can be found by the usual coordinates method (longitude first; longitude and latitude are here arbitrary figures). The center of a letter or letter-group is the location of the collecting-locality. The Hungarian localities, preceded by the co-ordinates, are: 32.52 Szuadó-völgy, 33.63 Baja, 38.44 Kapomérő, 42.100 Sarkadremete, 45.38 Kisbalaton, 47.45 Balatonlelle, 49.25 Őriszentpéter, 51.28 Szőce, 52.60 Szabadegyháza, 54.46 Sársikút, 55.51 Pétfűdő, 57.44 Németbánya, Iharkút, Kőrishegy, 57.49 Bakonynána, 57.67 Öcsa, 58.46 Bakonybél, 59.38 Külösvat, 64.56 Tatabánya, 65.94 Ohat-Pusztakócs, 67.58 Pisznice-hegy, 68.61 Esztergom, 69.80 Kisnána, 73.64 Deszkáspuszta, 74.38 Rajka, 75.90 Kecské-barlang, 76.116 Tákos

Mali Igman agrees rather well with a specimen from Kisbalaton (Smit, 1967, Figs, 10,11), material from the large intermediate region might eventually show that after all there are some slight differences between the southern and northern populations; if this should turn out to be the case, then the name agyrtes hadzhii Rosicky &
Carnelutti, 1959, must be applied to the northern populations (including Hungarian) as this subspecies was described from Srednja Bistrica and Rakic in east Slovenia. Individual variation in specimens from Németbánya is shown in Fig. 2 a—d.

C. agyrtes peusianus Rosický, 1955 — To the north of Hungary (i.e. in Czechoslovakia and Poland) this subspecies occupies a relatively small area between the ranges of a. agyrtes in the west and a. kleinschmidtianus in the east. In Hungary a. peusianus reaches the southernmost limit of its area of distribution and typical specimens have so far only been collected near Deszkáspuszta and Kisnána. Specimens from other localities are intermediates between this and other subspecies; see below. Males from Deszkáspuszta (in the Börzsöny-Mts.) exhibit variation in the shape and chaetotaxy of the movable process of the clasper from normal (Fig. 3a) to a strong resemblance to a. kleinschmidtianus (Fig. 3d).

Fig. 2. Ctenophthalmus agyrtes boinicus (from Németbánya). Outline of clasper and aedeagal lamella of four specimens
C. agyrtes kleinschmidtianus PEUS, 1950 — This east-European subspecies is found in the easternmost part of the country and we have seen it only from Tákos.

C. agyrtes eurous JORDAN & ROTHSCHILD, 1912 — Hitherto only known from two localities in Romania (see Fig. 1), but material of this subspecies has now also been collected in Sarkadremete.

**Intergrades:** The area of intergrades (hybrid forms) between two subspecies can be quite wide (up to 50 km or so). It is not always easy to determine the status of specimens which are actually intermediate between two subspecies and a good deal depends on the interpretation and evaluation of the taxonomic characters by the individual taxonomist (who may be inclined or is forced to base his conclusions on insufficient material). Geographical considerations are usually significant, but e.g. in eastern Hungary it might still be almost impossible to decide whether a given form is intermediate between *a. kleinschmidtianus* and either *a. peusianus* or *a. eurous* as intergrades between these subspecies will very likely be extremely similar. As is usual in a zone of intergradation, one may find in one locality specimens which are typical or near-typical representatives of either of the constituent subspecies together with a variety of intergrades. Apart from these various forms one may of course also find specimens which are just plainly abnormal in varying degrees (as e.g. two males *a. bosnicus* from Németbánya, ex *Troglodytes troglodytes*, are obviously somewhat abnormal; 18 other males from the same locality, but from normal mammalian hosts, are quite normal — see Fig. 2). When more and more material becomes available to fill in the numerous lacunae in the distribution maps, general agreement may eventually be reached among students of Siphonaptera concerning the status of some populations which at the moment are presumably best regarded as hybrid populations.

The following specimens indicate the existence of mixed populations: (a) The only male seen from Ócsa agrees on the whole with *a. peusianus* but the fixed process of the clasper as well as the aedeagal lamella show some signs of *a. eurous* influence. (b) Three males from Kísnaña (in the Mátra-hegység) are normal *a. peusianus* but the fourth (collected together with one of the *a. peusianus*) is virtually *a. bosnicus* except for the aedeagal lamella which has a touch of *a. peusianus* although the cuticular scales are coarse (Fig. 4). The occurrence of this specimen at Kísnaña is extra-
ordinary and puzzling. (c) A male from the Keeske-barlang (in the Bükk-hegység) is apparently nicely intermediate between *a. peusianus* and *a. eurous*. (d) Two males from Ohat-Pusztakócs seem to have characteristics of three subspecies in their genetic make-up, viz. of *a. peusianus*, *a. kleinschmidtianus* and *a. eurous*!

The map (Fig. 1) clearly demonstrates that a great deal of collecting should still be carried out in Hungary and especially east of the Duna as the study of much material will elucidate the status and ranges of the *agyrtes* populations in that part of the country.

In order to facilitate the determination of male specimens of *C. agyrtes*, we append an illustrated key to the five subspecies dealt with above:

1. Ventral lobe of fixed process of clasper (Fig. 5, v.l.) at most a little wider than apex of distal arm of sternum IX (Fig. 5, d.a.st. IX) and apically not markedly concave (Figs. 5, 6) 2
   - This lobe distinctly broader than apex of sternum IX and with a long concave apical margin (Figs. 7—9) 3
2. Ventral lobe of fixed process (Fig. 6) strongly obtuse, its ventro-posterior angle not or hardly slanting; sinus between this lobe and the dorsal one often relatively small; apex of sternum IX (Fig. 6) usually with a small dorso-apical notch and a rounded posterior margin; aedeagal lamella (Fig. 11) very broad, distance between ventral part

Fig. 9. Clasper and sternum IX of *Ctenophilthalmus agyrtes eurous* (holotype). Fig. 10. Outline of aedeagus of *C. a. eurous* (holotype). Figs. 11—14. Aedeagal lamella of: 11. *C. a. bosnicus* (from Kisbalaton); 12. *C. a. agyrtes* (from Eisenerz, Austria); 13. *C. a. peusianus* (from Dobšiná, Czechoslovakia); 14. *C. a. kleinschmidtianus* (from Kiev, U. S. S. R.)
of apical sclerite of aedeagus and lamella short; surface of aedeagal lamella slightly striated, not squamose

*agyrtes bosnieus* Wagner

— Ventral lobe of fixed process (Fig. 5) less obtuse, its ventro-posterior angle slanting; sinus between this lobe and the dorsal one deep; apex of sternum IX (Fig. 5) without a small dorsoapical notch, with a rather straight and obtuse posterior margin; aedeagal lamella (Fig. 12) fairly narrow, its surface densely squamose and its ventral margin serrated; distance between ventral part of apical sclerite of aedeagus and lamella about equal the basal width of the lamella

*agyrtes agyrtes* (Heller)

3. Distal arm of sternum IX basally not considerably narrower than apically (Fig. 9); aedeagal lamella quite large, with surface striae (Fig. 10)

*agyrtes eurous* Jordan & Rothschild

— Distal arm of sternum IX basally markedly narrower than apically (Figs. 7, 8); surface of aedeagal lamella densely squamose (Figs. 13, 14)

4. The lower of the two large setae on the dorsal lobe of the fixed process placed near the upper one (Fig. 7); aedeagal lamella hanging down (Fig. 13)

*agyrtes peusianus* Rosický

— The lower of the two large setae on the dorsal lobe of the fixed process usually farther removed from the upper one (Fig. 8); aedeagal lamella (Fig. 14) normally folded up (when hanging down, the tip points forward, not downward as in *a. peusianus*)

*agyrtes kleinschmidtianus* Peus
