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A KEY TO THE ADULTS OF BRITISH LESSER WATER BOATMEN (CORIXIDAE)

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ABSTRACT

A key is provided to the 34 British members of the Corixidae—the lesser waterboatmen. It has been designed for use by the non-specialist and requires no more specialist equipment than a ×10 handlens, supported by a ×60 compound microscope for detailed confirmations. Unfortunately, this restriction means that it is impossible to identify most females directly. However, it should be comparatively simple to match females with appropriate males using the hemielytral patterns. Only a few species may be identified alive, in the first instance.

INTRODUCTION

THE CORIXIDAE (lesser water boatmen) are a family belonging to the large and diverse insect order Hemiptera (bugs), which includes terrestrial, surface aquatic and sub-aquatic groups. Typically, bugs have piercing-sucking mouthparts and feed on both other animals and plants. Perhaps, the best known are the terrestrial aphids which attack plants of economic importance. In contrast, the Corixidae are a sub-aquatic group which may be distinguished most easily from the remainder by the lack of visually obvious piercing-sucking mouthparts. Structurally, they form a rather homogeneous group with close similarities between certain species. Indeed, it is not always possible to identify solitary females. For simplicity, this key is confined to the identification of males but most females can be matched with known males according to the colour patterns of the hemielytra (wing covers). For a more comprehensive, but more difficult, key which includes females, see Savage (1989).

The accurate identification of specimens, while interesting in itself, is an essential prerequisite for detailed ecological studies. Thus, this key is followed (Savage, 1990) by an example of an ecological investigation and a brief review of the distribution of Corixidae in British lakes, to set it in an appropriate context.

Thirty-four species of Corixidae have been recorded in Britain (p. 491). Most are each associated with a particular set of environmental conditions, i.e. biotopes (e.g. Macan, 1938, 1954; Savage 1982b). Corixidae are, typically, inhabitants of still waters such as lakes and ponds. They occur less frequently in canals and the quieter parts of rivers but are absent from rapid streams (Savage, 1989). The established associations of particular species with particular biotopes are based almost exclusively on studies of relatively large stable lakes. There have been few studies of small unstable ponds, although present evidence suggests that corixid communities may be similarly unstable (Bröring & Niedringhaus, 1988; Savage, 1979, 1981). Further, well planned, studies are required in such habitats if we are to extend our knowledge of the ecology of the group.

The distribution of macroinvertebrates in rivers has been thoroughly studied and they are used by the water industry as indicators of water quality. Corixidae could fulfill a

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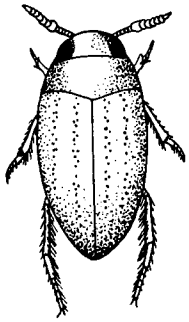
similar function in still waters. Corixid community structure gives an indication of the fundamental biological nature of a water body and any induced changes such as eutrophication or acidification (Henrikson & Oscarson, 1978b, 1981; Jansson, 1987; Savage, 1982). Thus, an extension of our knowledge will facilitate their possible use for biological monitoring and, hence, help to form a basis for more reliable environmental management.

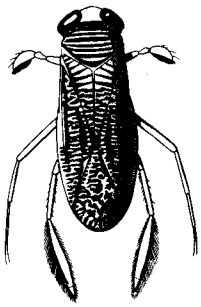
Key to separate adult Corixidae from other freshwater insects in Britain

1 Wing cases (elytra or hemielytra) completely hiding the abdomen from dorsal (top) view . . 2

– Insects of any other form. These are not considered further in this key. See Croft (1986) or Macan (1959)

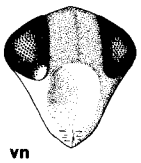


2 Elytra, each of which is rather hard and not divided up into separate areas, meet in a straight longitudinal line down the centre of the dorsal (upper) surface without overlapping. Biting mouthparts . Order **COLEOPTERA** (Water Beetles) see Friday (1988)



– Hemielytra, each of which is somewhat membranous and divided into three regions, overlapping posteriorly so that the line of their meeting has a distinct bend. Mouthparts formed into a pointed tube (rostrum) or apparently missing . . . . . Order **HEMIPTERA** (Water Bugs) 3

3 Bugs with tube-like sucking mouthparts—see Savage (1989)



– Bugs with much reduced mouthparts, lacking a tube . . . . . Family **Corixidae**

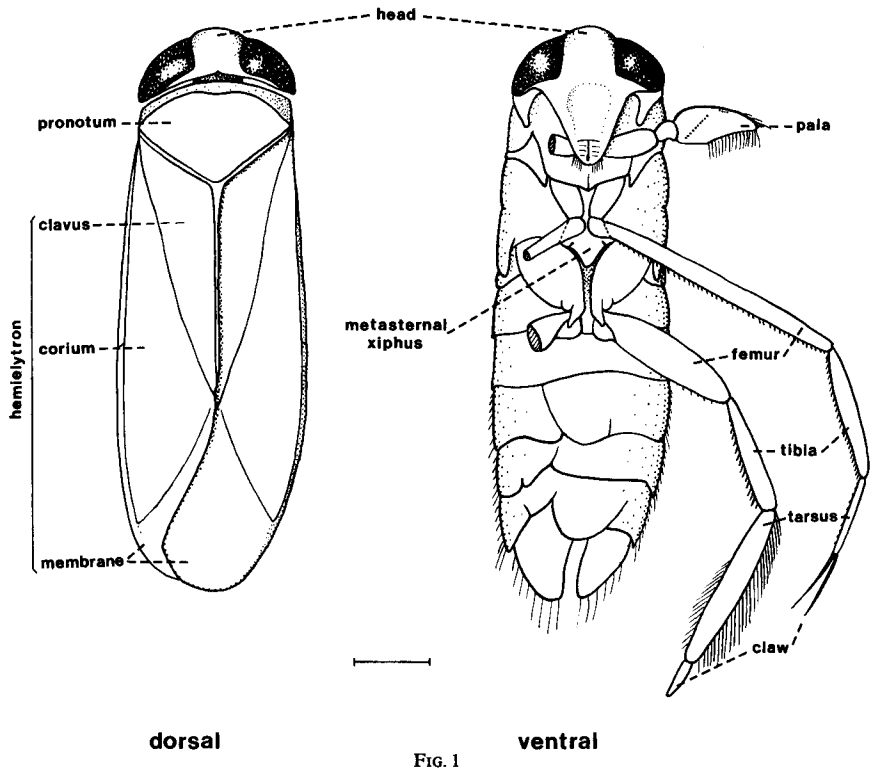


FIG. 1
Dorsal and ventral views of an adult male corixid, *Sigara falleni*. Scale line 1mm.

THE STRUCTURE OF A CORIXID

The proper use of this key is dependent upon a knowledge of the structure of these insects and of the associated morphological (anatomical) terms.

The positions of structures are normally described using one or more of the following terms: *dorsal* (above), *ventral* (beneath), *lateral* (side), *anterior* (front), *posterior* (rear), *proximal* (nearer to the body centre), *distal* (further from the body centre). However, plain language has been used when it is sufficiently precise. The numbering of the parts of structures begins at their proximal ends.

As with all adult insects, the body is divided into three sections; the *head*, *thorax* and *abdomen*, most clearly seen in ventral view (Fig. 1)

The HEAD is triangular in anterior or ventral view. A zone extending ventrally from between the eyes on the anterior surface of the head is flattened or concave in all males; whilst it is convex in all females except those of *Glaenocorisa propinqua*.

There are three segments in the THORAX, identified by the pro-words *pro-*, *meso-* and *meta-* respectively. The anterior segment (*prothorax*) bears the front pair of legs. The *mesothorax* carries the first pair of wings, adapted to form *hemielytra* (wing covers) and the middle pair of legs. The *metathorax* has the second pair of wings (wings) and the hind pair of legs. The dorsal plates (nota) of these segments are called *pronotum*, *mesonotum*, and *metanotum* respectively. The pronotum is of particular importance in this key. The corresponding ventral plates (sterna) are the *prosternum*, *mesosternum* and *metasternum*. The latter posseses a triangular plate between the leg bases, the *metasternal xiphus*, which is of importance in the key. Each hemielytron consists of three sections, a mid-proximal *clavus*;

a lateral-proximal *corium*; and a distal *membrane*. Colour patterns on the hemielytra, particularly on the corium, are important in this key, and also for the matching of females with known males. Confirmatory drawings of hemielytral patterns are appended as Fig. 3, p. 509–511. Each *leg*, typically, has six parts: a proximal, short, *coxa*; an inconspicuous *trochanter*; conspicuous *femur*, *tibia*, *tarsus* (which may be subdivided) and one or two *claws*. The *pala*, an anterior tarsus, is flattened in males and carries stout, short, brown *palar pegs* on its anterior surface. These have characteristic arrangements in the majority of species. The pala of the female is triangular in cross section and varies little between species. Confirmatory drawings of palae are appended as Fig. 4, p. 512–516.

Each segment of the ABDOMEN consists of a dorsal plate (*tergum*) and a ventral plate (*sternum*). The outline of the anterior and posterior margins of the segments differs between the sexes. Most males bear a small, black, toothed plate (*strigil*) on the posterior margin of the sixth tergum (Fig. 2). The *male genitalia* comprise a *genital capsule*, a modified ninth segment, to which are attached a central *aedeagus* (penis) and lateral *parameres* (Fig. 2). The *right parameres*, like the palae, are of characteristic shapes in nearly all species and are used as major diagnostic features in the key. Confirmatory drawings of parameres

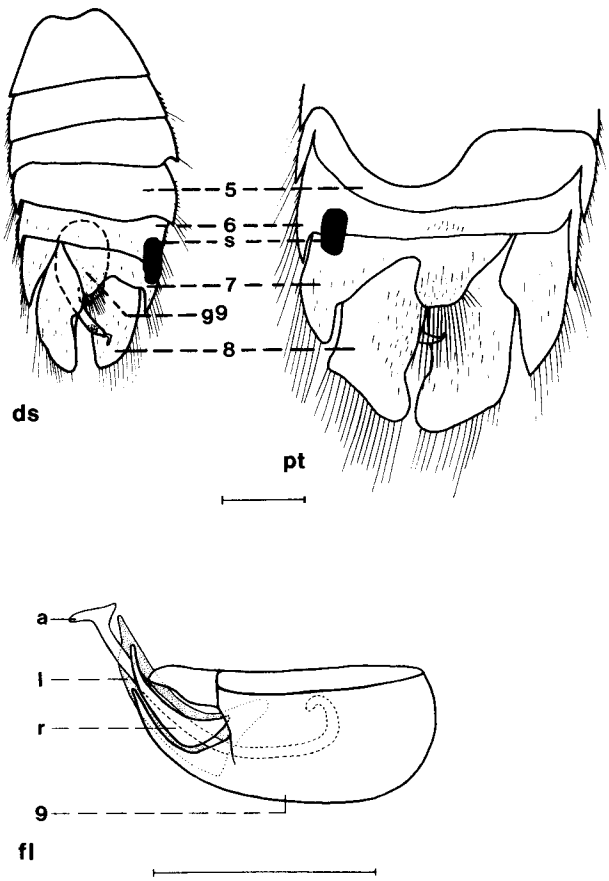


FIG. 2

Upper: Abdomen of male *Sigara dorsalis* (left) and *Corixa punctata* (right) to show the position of the strigil (s) and genital capsule (g), the abdominal segments are numbered. Lower: Right lateral view of the genital capsule in a male *Sigara falleni*. a = aedaegus, l = left paramere, r = right paramere, 9 = segment 9. Scale line 1mm.

are appended as Fig. 4. It should be noted that the asymmetry of the parameres is reversed in the genus *Corixa*.

Collection and Preservation

The collection of corixids is a simple process. A sturdy, long-handled, pond net is swept, backwards and forwards in a figure-of-eight, through the water—with the open end facing the direction of movement. It is best to sweep just above the substratum, so that the bugs are stirred up and caught as they swim away. Try to avoid collecting too much debris! Excess water should be drained from the net and the contents tipped carefully onto a large white plastic sheet, or into a white enamel (or plastic) dish. The boatmen should be placed in sample tubes, using an artist's small paintbrush, together with a few drops of water and a scrap of vegetation.

Information may be gained on the biotopes of the different species (and of the composition of different corixid communities) by restricting a particular net sweep to a particular habitat. Separate net sweeps should be made in open water, along the edge of emergent vegetation, and within the vegetation at different distances from the edge. Alternatively, collections could be taken in association with particular plant species.

Quantitative estimates of corixid communities present certain problems. Techniques based on numbers per unit effort (see Chalmers & Parker, 1989) are simplest; making a standard net sweep over a known area of substratum. For instance, Savage (1979, 1981) collected Corixidae using a robust hand net of rectangular cross section 25cm wide by 20cm high. (mesh 7.5 strands cm^{-2}). Two imaginary points, A and B, 2m apart, were selected. The net was placed in the water at A and moved rapidly, just above the substratum, to B; back to A and then to B again, with the opening always facing the direction of movement. This sampled an area of approximately $0.5m^2$. Ten such sweeps were made in a particular biotope. The numbers, of each species, were counted and means with confidence limits calculated (see Elliott, 1977). Thus, estimates of the numbers per unit area, for each species present, were made. Crisp (1962*a*, 1962*b*) used a slightly different technique, adapted for deeper water, to estimate numbers of *Arctocorisa germari* in an upland reservoir. Popham (1964) counted numbers seen in quadrats placed on the substratum, whilst Henrikson & Oscarson (1978*a*) and Behr (1988) designed traps to catch sub-aquatic insects (including corixids) which visit the surface. Indeed, details of the method must be adapted for each particular habitat—and perfected in the most awkward biotope where comparative studies are planned.

Specimens, taken back to the laboratory in tubes containing a little water and plenty of air, may be maintained for short periods in aquaria. These should contain water a few centimetres deep, material from the substratum, stones and plants; the whole being covered with gauze to prevent escape.

Unfortunately, it is (in most cases) necessary to kill corixids before attempting identification to species—in order to see the characters employed. Specimens should be killed with ethyl ethanoate (ethyl acetate) vapour [chemical nomenclature follows ASE, 1985, Ed.]. A series of glass (NOT plastic) tubes, approximately 10cm × 2.5cm are useful. A layer of celluloid chips, a few mm deep, is placed in each tube and a few ml of ethyl ethanoate added. A plug of cotton wool, (about 1cm long) is inserted immediately and covered by a folded cone of filter paper to prevent the specimen becoming entangled in cotton wool. The specimen is added and the tube corked. This procedure ensures the slow escape of vapour and prevents condensation and subsequent damage to specimens. The

tubes are effective for a few weeks and may be reactivated by the addition of ethyl ethanoate directly onto the celluloid chips. Specimens left in the tubes remain relaxed.

Specimens may be preserved in an alcohol-based mixture, pinned or mounted on card or celluloid. A suitable mixture comprises 80 parts by volume of 70% ethanol (ethyl alcohol), 10 parts of 40% methanal (formaldehyde) and 10 parts of propane 1,2,3 triol (glycerol). When specimens are pinned or mounted, care must be taken to ensure diagnostic features are visible—check through the key. Males should be mounted in pairs, one with the dorsal and the other the ventral surface uppermost. A water-soluble glue, such as Gum Tragacanth, must be used for mounting. Data labels must include date of capture, National Grid Reference, and a note of the biotope.

EXAMINATION

Ideally, specimens should be surface dry, relaxed and unmounted. A good quality low-power binocular microscope, with magnifications of $\times 5$, $\times 10$ and $\times 40$ is ideal for basic use. The most important requisite is a good, directional, light source, placed to one side. Fibre optical systems, with flexible stems, and using halogen bulbs are suitable. In addition, a compound microscope with a magnification of $\times 100$ is desirable for the examination of male palae and parameres.

As the equipment just described will not be available for many, this key has been designed for use with a $\times 10$ handlens, supported by a microscope with a minimum magnification of $\times 60$—for examination of palae and parameres. Unfortunately, this simplification of the key means that it is impossible to identify most females directly. When you reach couplet 4, males and females should be separated, and the females placed to one side (for subsequent matching with appropriate males).

Divide the males into supposed species groups. Take one specimen from each group. Firstly, remove the left pala and place it, in a drop of water on a microscope slide, anterior surface upwards so that the palar pegs show clearly, as in Fig. 4. Secondly, dissect out the genital capsule, which is usually dark brown in colour (Fig. 2), by removing the posterior-most abdominal sterna and orientate it as shown. Carefully remove the right paramere. Keeping the same orientation, place it in the drop of water on the slide. Place a cover-slip lightly over both pala and paramere, taking care not to tip them over. In the genus *Corixa* both parameres should be removed—see key. Fine pins, with their heads removed, mounted in match sticks are excellent instruments for manipulation of specimens. Repeat the dissections for one male in each species group, leaving the other specimens intact. The above procedure ensures the possibility of direct comparisons with text figures. However, remember that some compound microscopes project an inverted image—upside down and back-to-front.

Identification is much easier (and more reliable) if a number of species are examined together, as the relative differences are more readily apparent. Proceed through the key, using an intact specimen or your dissection, as required. With increasing experience, it will be found that palae can be examined on an intact specimen, and the parameres in an intact genital capsule.

The initial dissections may be made into permanent reference slides. Not all the palae and parameres are illustrated in the key, but all (of the Corixinae) are shown in Fig. 4, for confirmation, if required.

On occasion, the absolute (or relative) lengths of specimens are used in the key. It is wise to measure, rather than guess! A calibrated eye-piece graticule, a small pair of dividers, or millimetre square graph paper may be used as appropriate.

When the males have been identified, the females may be matched with the known males according to their hemielytral patterns. The pattern is seen more clearly when the hemielytron is deflected to one side and viewed against a white background, or against the light. Most species are illustrated in Fig. 3. The exceptions are *Sigara fallenoidea*, *S. striata*, and *Corixa iberica* since they are virtually indistinguishable from *S. falleni*, *S . dorsalis*, and *C. punctata* respectively

CLASSIFICATION
and Checklist

a traditional classification would read

Class	INSECTA
Order	HEMIPTERA
Sub-Order	HETEROPTERA
Infra-Order	NEPOMORPHA
Family	CORIXIDAE

Some authorities would raise the Insecta to a sub-phylum. Others regard the Heteroptera an an Order in its own right. The important taxon for this key is the bottom one: the family Corixidae.

MICRONECTINAE
- ***Micronecta*** Kirkaldy, 1897
  - ***scholtzi*** (Fieber, 1847)
    - = meridionalis (Costa, 1863)
  - ***minutissima*** (Linnaeus, 1758)
  - ***poweri*** (Douglas & Scott, 1869)
    - = minutissima auctt. Britt nec.(Linnaeus, 1758)

CYMATIAINAE
- ***Cymatia*** Flor, 1860
  - ***bonsdorffii*** (Sahlberg, C., 1819)
  - ***coleoptrata*** (Fabricius, 1776)
    - = s. insularis Walton, 1942

CORIXINAE
- ***Glaenocorisa*** Thomson, 1869
  - ***propinqua*** (Fieber, 1860)
    - sub species ***propinqua*** (Fieber, 1860)
    - sub species ***cavifrons*** (Thomson, 1869)
    - = *alpestris* (Douglas & Scott, 1870)
    - = *quadrata* Walley, 1930
- ***Callicorixa*** White, F.B., 1873
  - ***praeusta*** (Fieber, 1848)
    - = wollastoni (Saunders, 1892)
  - ***wollastoni*** (Douglas & Scott, 1865)
    - = cognata (Douglas & Scott, 1870) nec. (Fieber, 1860)
    - = caledonica (Kirkaldy, 1897)

Corixa Geoffroy, 1762
dentipes (Thomson, 1869)
punctata (Illiger, 1807)
= geoffroyi Leach, 1817
iberica Jansson, 1981
affinis Leach, 1817
panzeri (Fieber, 1848)

Hesperocorixa Kirkaldy, 1908
linnaei (Fieber, 1848)
sahlbergi (Fieber, 1848)
castanea (Thomson, 1869)
moesta (Fieber, 1848)

Arctocorisa Wallengren, 1894
carinata (Sahlberg, C., 1819)
germari (Fieber, 1848)

Sigara Fabricius, 1775
Sub Genus *Sigara*
dorsalis (Leach, 1817)
= striata auctt. Britt. nec. (L.,1758)
= lacustris Macan, 1954
striata (Linneaus, 1758)

Sub Genus *Subsigara* Stichel, 1935
distincta (Fieber, 1848)
= douglasi (Fieber, 1865)
falleni (Fieber, 1848)
fallenoidea (Hungerford, 1926)
= pearcei Walton, 1936
fossarum (Leach, 1817)
scotti (Douglas & Scott, 1868)

Sub Genus *Vermicorixa* Walton, 1940
lateralis (Leach, 1817)
= *hieroglyphica* (Dufour, 1833)

Sub Genus *Pseudovermicorixa* Jaczewski, 1962
nigrolineata (Fieber, 1848)

Sub Genus *Paracorixa* Stichel, 1955
concinna (Fieber, 1848)

Sub Genus *Retrocorixa* Walton, 1940
limitata (Fieber, 1848)
semistriata (Fieber, 1848)
venusta (Douglas & Scott, 1869)

Sub Genus *Halicorixa* Walton, 1940
selecta (Fieber, 1848)
stagnalis (Leach, 1817)
= lugubris (Fieber, 1848)

The Subgenera are not used in this key.

Acknowledgements

The drawing of *Cymatia bonsdorffii* is by Dr. G. A. Walton. The remaining text figures in the main key were drawn by the late Dr. T. T. Macan, or the author, and the majority are taken from Savage (1989) by kind permission of the Freshwater Biological Association. Text figures in the introductory key are mostly by Marilyn Crothers from Croft (1986).

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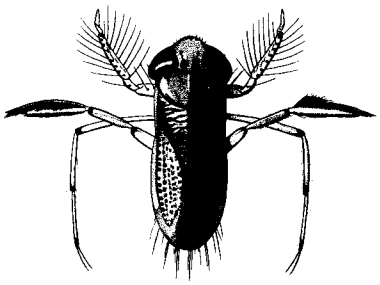
Key to Subfamilies and Species of Corixidae in Britain

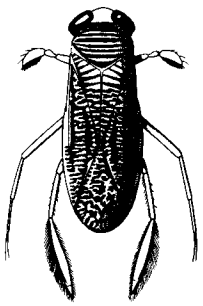
When a key couplet is not reached directly from the preceding one, the number of the couplet from which it originates is given in parentheses.

1 Length 1.5–2.5mm. . . . . .
Subfamily **MICRONECTINAE**
see Savage (1989) for a key to the three species found in Britain.

– Length 3.0–14.0mm 2



2 Pronotum uniformly brown; palae long and cylindrical, with long bristles. . . . . .
Subfamily **CYMATIAINAE** 3



– Pronotum with between 4 and 20 transverse yellow lines; palae short, flat or triangular in cross section.
Subfamily **CORIXINAE** 4

3 Length 3.0–4.5mm; corium (mid-outer section of the hemielytron) with two darker longitudinal lines. . . . . ***Cymatia coleoptrata***

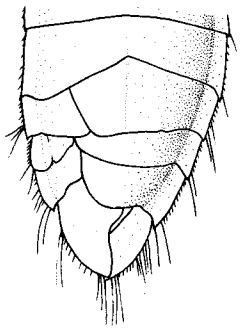
cl

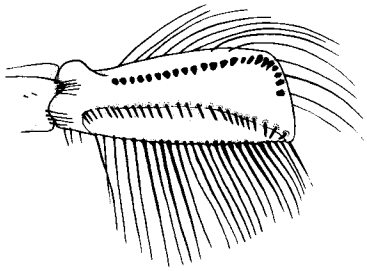
– Length 5.5–6.5mm; corium with many irregular broken transverse lines. . ***Cymatia bonsdorffii***

bd

Note: The drawings of hemielytra (Fig. 3), palae and parameres (Fig. 4) are identified by code letters. These letters accompany the illustrations throughout the key, so that all may be identified to species.

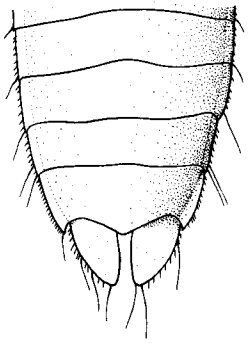
4(2) Anterior and posterior margins of the hindmost abdominal segments, in ventral view, are irregularly curved, never parallel; pala (outer segment of the front legs) flat and with one or two rows of strong, short palar pegs. MALES 5

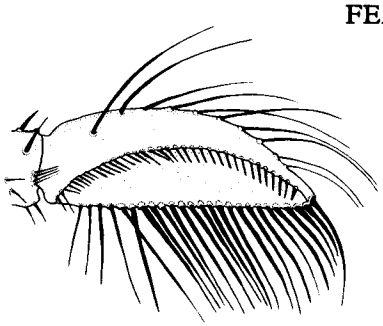




Note: a zone extending ventrally from between the eyes on the anterior surface of the head is flattened or concave in all males. It is convex in all females except those of *Glaenocorisa propinqua*.

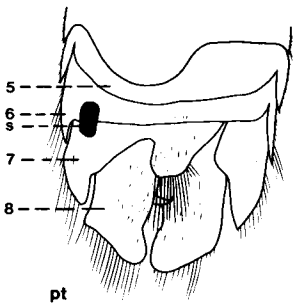
– Anterior margins of the abdominal segments straight, or regularly curved, and parallel; pala triangular in cross-section and without pegs. FEMALES



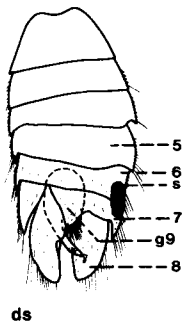


Note: the shape of the pala, and the arrangement of palar pegs, form major diagnostic criteria in the remainder of this key. Unfortunately, the pala of the female varies little from species to species. Females should be set aside at this point. They are best identified through comparison of their hemielytral patterns with those of known males.

5 Width of the body never less than 3.5mm ; length, 8.0–14.0mm; strigil, s, (a small black toothed plate on the posterior margin of the sixth abdominal tergum) on the left side; the cleft on the dorsal surface of segment 7 on the right side. [pala long and narrow—this character is not exclusive]. . . ***Corixa*** 6

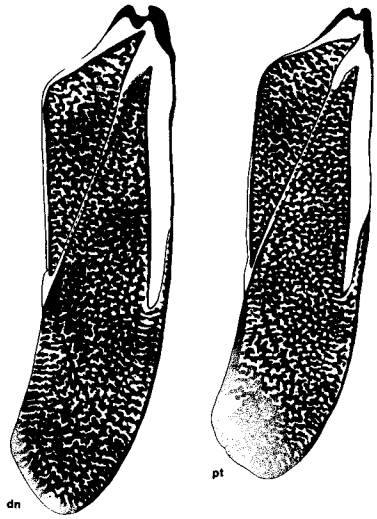


– Width of the body never greater than 3.0mm; length, 4.5–10.0mm; strigil (if present) on the right side of the abdomen, the cleft on the dorsal surface of segment 7 on the left. 10

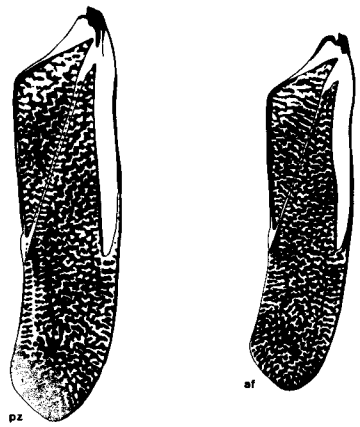


Note: the hemielytra should be deflected to reveal the dorsal surface of the abdomen. See Fig. 2, p. 488, for an explanation of the labelling.

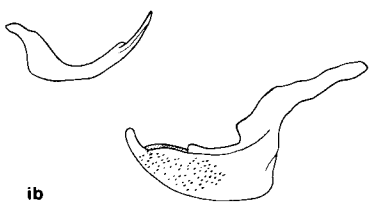
6 Length *usually* 12.0–14.0mm; pronotum *usually* with (14) 15–20 transverse lines; corium (of the hemielytra) markings irregular. 7



– Length *usually* 8.0–11.0mm; pronotum *usually* with 10–14 transverse lines; corium (of the hemielytra) markings containing a number of distinct diagonal zigzag lines. 9

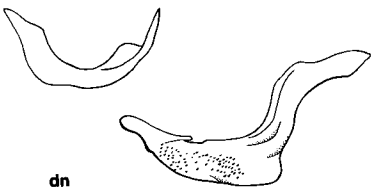


7 Body of right paramere (of the genitalia) about one-third as deep as it is long, with a distinct narrow upwardly-pointing terminal process; left paramere narrow and with a relatively smooth outline. 8

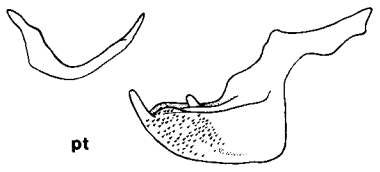


Note: both parameres should be removed for identification of the genus *Corixa*.

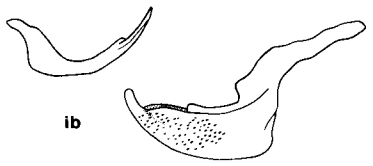
– Body of the right paramere about one-quarter as deep as long and without an upwardly-pointing terminal process; left paramere broad proximally, then suddenly narrowing towards the tip. . . . ***Corixa dentipes***



8 Right paramere with two distinct dorsal processes, one terminal and the other central. . . . . ***Corixa punctata***

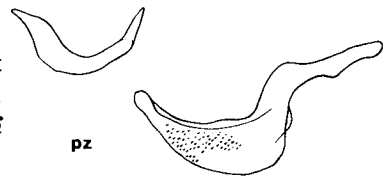


– Right paramere with a distinct terminal dorsal process; the central one much reduced. . . . ***Corixa iberica***

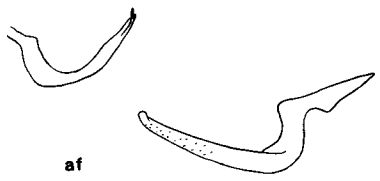


Note: *C. iberica* is restricted to the northwestern extremities of the British Isles (Savage, 1989).

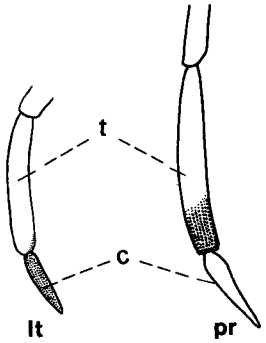
9(6) Length *usually* 10.0–11.0mm; body of the right paramere about one-quarter as deep as it is long. . ***Corixa panzeri***



– Length *usually* 8.0–9.0mm; body of the right paramere about one-eighth as deep as it is long. . ***Corixa affinis***



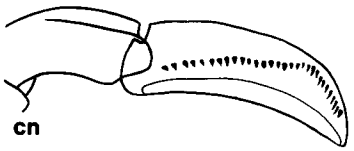
10(5) Posterior tarsi (t) with a dark mark at the distal end, and/or dark claws (c). 11



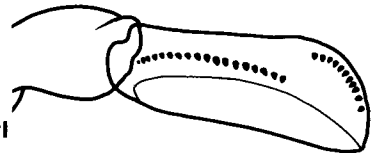
– Posterior tarsi and claws uniformly pale.. . . 14

Note: the long hairs along the margin of the tarsus should be brushed aside before examination as they may give the appearance of a dark mark.

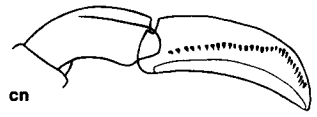
11 Pala with one row of pegs. 12



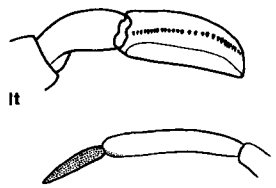
– Pala with two rows of pegs. 13



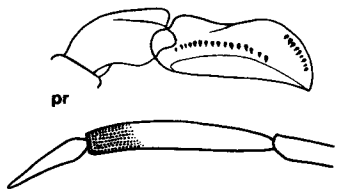
12 Palar pegs following a distinct curve, distally; posterior tarsus and claw each with a small dark mark. . . . . ***Sigara concinna***



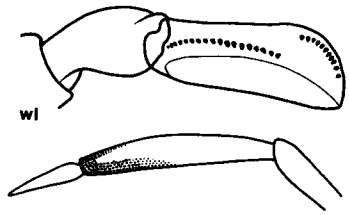
– Palar pegs forming a straight line; posterior tarsus usually clear, but claw entirely dark. . . . . ***Sigara lateralis***



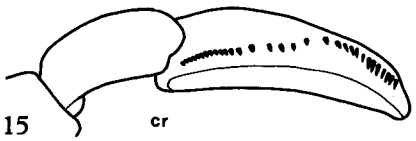
13 (11) Pala with a depression (kink) mid-way along the dorsal surface; dark mark on posterior tarsus square. . . . . ***Callicorixa praeusta***



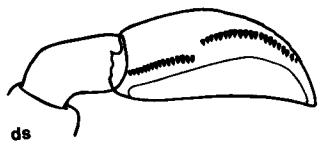
– Pala without a depression; dark mark on posterior tarsus triangular. . . ***Callicorixa wollastoni***



14 (10) Pala with one row of pegs. 15



– Pala with two rows of pegs. 28



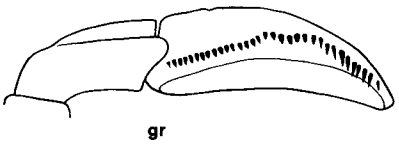
15 Right paramere with a bifid (forked) tip.. . . 16

– Right paramere with a single tip. 19

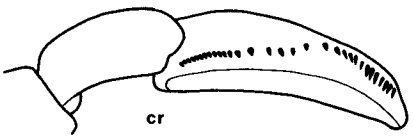
16 Length 7.5–10.0mm. *Almost always* found in fresh water. 17

– Length 5.0–6.5mm. *Almost always* found in somewhat saline, brackish, water.. 18

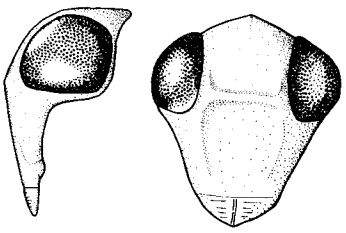
17 Palar pegs in a continuous, closely-set line. . . . ***Arctocorisa germari***

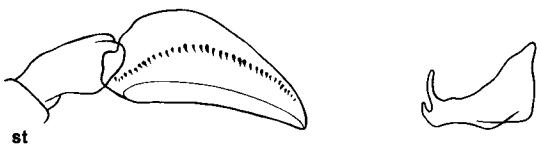


– Palar pegs arranged in a more discontinuous line. ***Arctocorisa carinata***

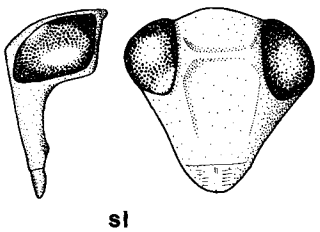


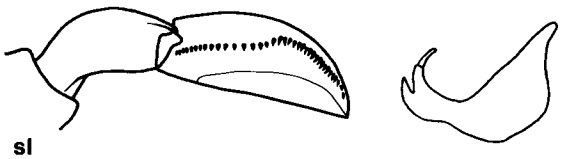
18 (16) Pala broad; the transverse ridge across the face is level with a line drawn through the ventral margin of the eyes. . . . . ***Sigara stagnalis***

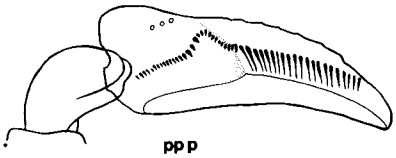




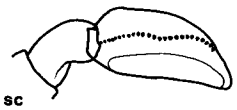
– Pala narrow; the transverse ridge across the face is much higher than a line drawn through the ventral margin of the eyes. . . . . ***Sigara selecta***



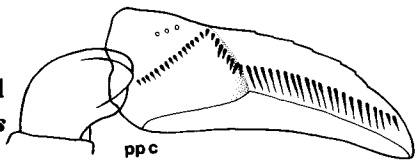




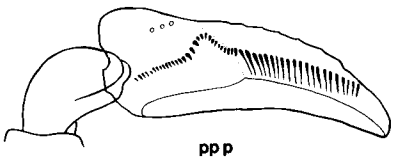
19 Distal palar pegs end in long bristles. . . . .
(15) ***Glaenocorisa propinqua*** 20



– Distal palar pegs do not end in bristles. . . . 21

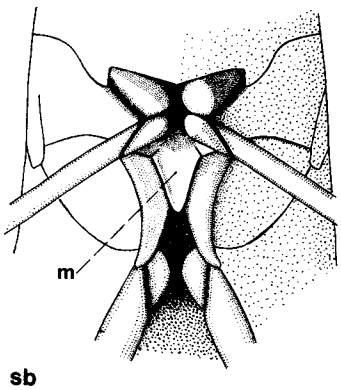


20 Palar pegs forming an arc which reaches the dorsal margin of the pala. . . . . ***G. p. cavifrons***



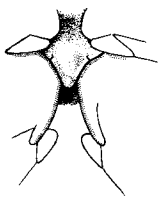
– Palar pegs forming an arc which does not reach the dorsal margin of the pala. . ***G. p. propinqua***

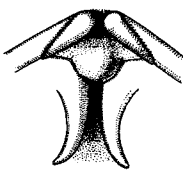
Note: this is the only species with two named sub-species occurring in the British Isles. However, I have seen specimens from the English/Scottish border that were intermediate in appearance. The females cannot be separated at all.

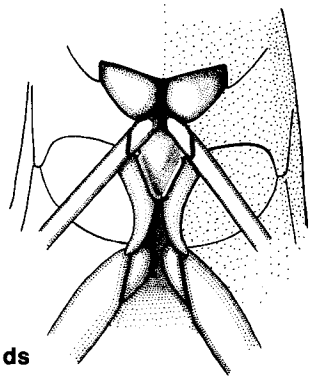


21 Metasternal xiphus, m, (a triangular plate on the
(19) ventral surface) long. 22

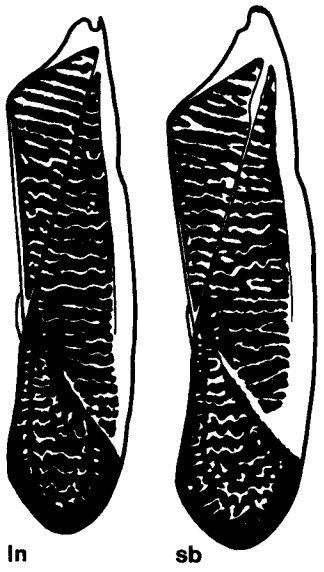
– Metasternal xiphus short. 25



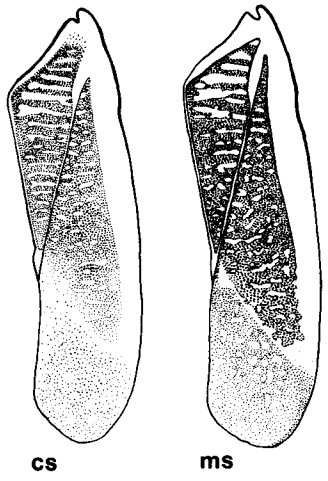




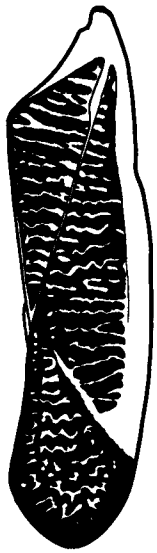
22 Length 7.0–9.0mm; hemielytral pattern shows a marked contrast between light (yellow) and dark (black) lines. 23



– Length 4.5–6.0mm: hemielytra brownish with little contrast between the light and dark lines. 24

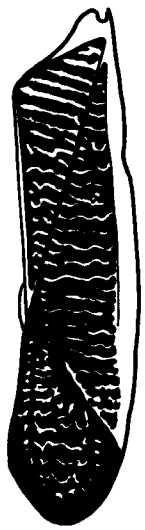


23 Right paramere (of the genitalia) continuously curved, i.e., sickle-shaped; dark markings on each hemielytron do not quite reach the posterior tip of the corium. . . . ***Hesperocorixa sahlbergi***



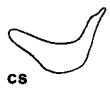
sb

– Right paramere almost straight distally; dark markings on each hemielytron do reach the posterior tip of the corium. . ***Hesperocorixa linnaei***



ln

24 (22) Right paramere tapering towards the tip. . . . ***Hesperocorixa castanea***

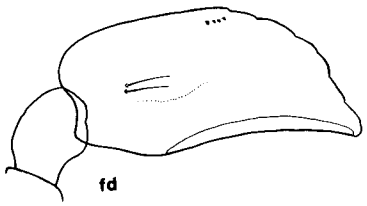


cs

– Right paramere almost parallel-sided. . . . . ***Hesperocorixa moesta***

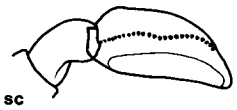
ms

25 (21) Length 7.0–8.0mm; pala large and broad with a few inconspicuous pegs near to the dorsal margin. ***Sigara fallenoidea***



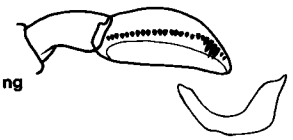
Note: *S. fallenoidea* is confined to Ireland.

– Length 5.0–6.75mm; pala with conspicuous pegs. 26

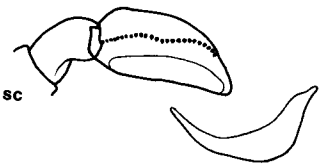


26 Pronotum with 4–6 transverse light lines; pala and right parameres as shown in couplet 27 (below). 27

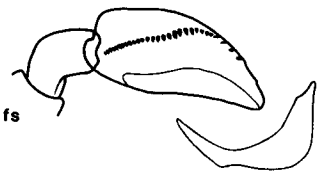
– Pronotum with 7 or more transverse light lines; pala (note the long distal pegs) and right parameres as shown. The depth of colour on the hemielytra is very variable. . . . . ***Sigara nigrolineata***



27 Proximal dorsal edge of pala proceeding from the tibia in a wide curve; palar pegs forming an undulating line. . . . . ***Sigara scotti***



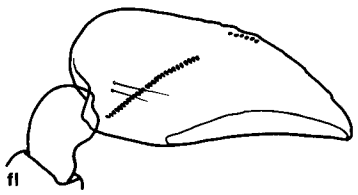
– Proximal dorsal edge of pala proceeding from the tibia in an abrupt curve; palar pegs forming a diagonal line. . . . . ***Sigara fossarum***



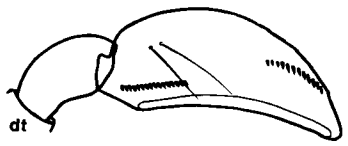
28 (14) Length 6.5–9.0mm; length of pala greater than 0.7mm. 29

– Length 4.5–6.5mm; length of pala less than 0.6mm. 32

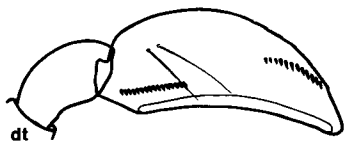
29 Width of pala more than half of its length; proximal row of palar pegs forming a diagonal line. . . . .
Sigara falleni



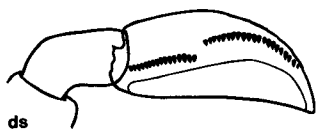
– Width of pala less than half of its length; proximal row of palar pegs parallel with its long axis. . . 30



30 The two rows of palar pegs widely separated from each other. . . . . ***Sigara distincta***



– The two rows of palar pegs only slightly separated from each other. 31

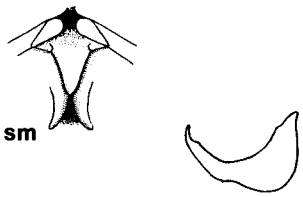


31 Right paramere (of the genitalia) with a distal step.
Sigara dorsalis

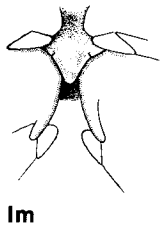
– Right paramere without a distal step. . . . .
Sigara striata

Note: Within the British Isles, *S. striata* is confined to the extreme southeast of England, where it hybridises with *S. dorsalis* (Savage, 1989).

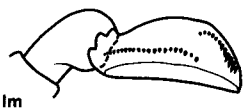
32 Metasternal xiphus (triangular plate) long; pala (28) and paramere as shown. . ***Sigara semistriata***



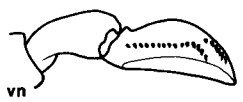
– Metasternal xiphus short. 33



33 12–16 palar pegs in the distal row. . . . . ***Sigara limitata***



– 4–7 palar pegs in the distal row. ***Sigara venusta***



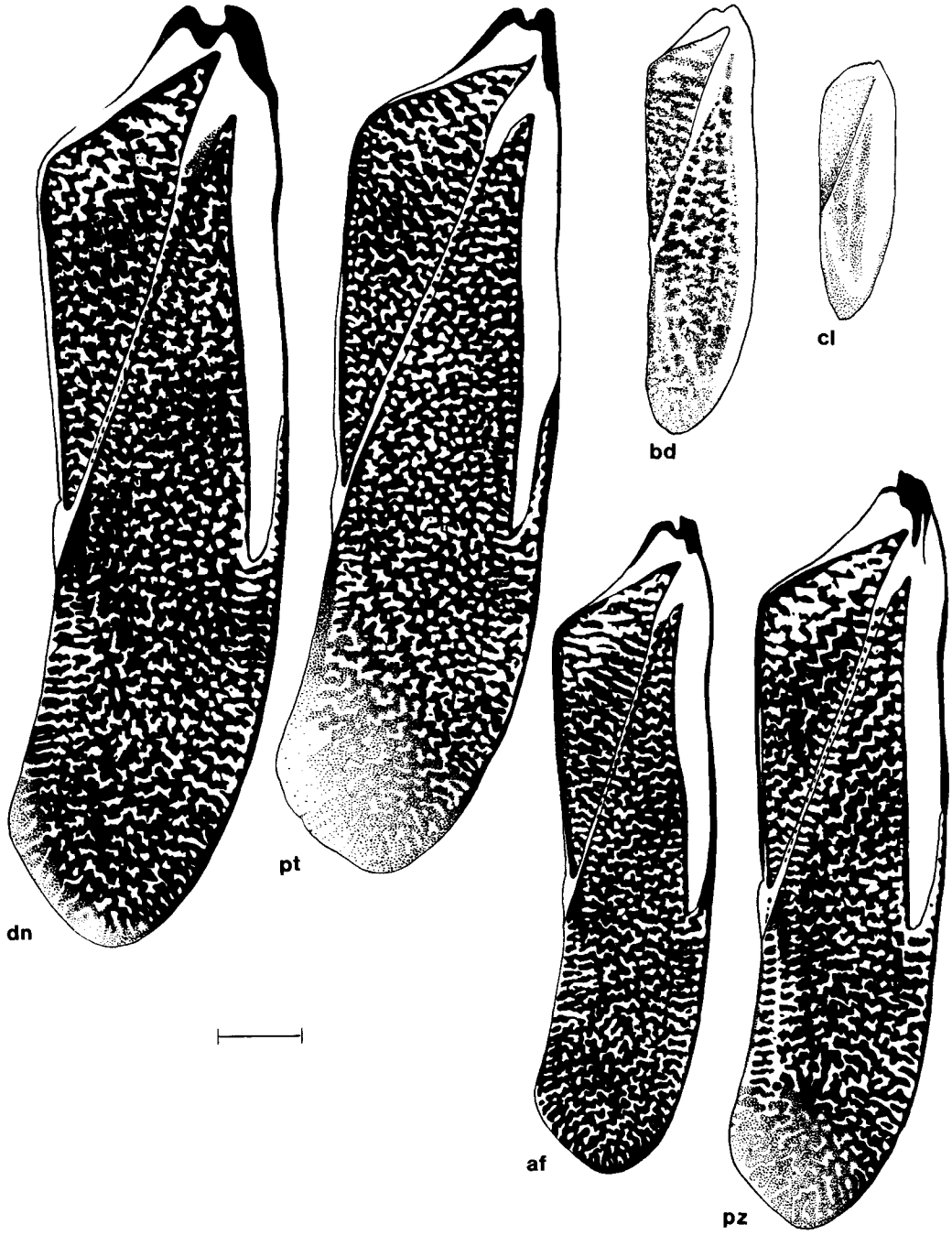


FIG. 3

Hemielytral patterns of British Corixidae. af = *Corixa affinis*, bd = *Cymatia bonsdorffii*, cl = *C. coleoptrata*, cn = *Sigara concinna*, cr = *Arctocorisa carinata*, cs = *Hesperocorixa castanea*, dn = *Corixa dentipes*, ds = *Sigara dorsalis*, dt = *S. distincta*, fl = *S. falleni*, fs = *S. fossarum*, gr = *Arctocorisa germari*, lm = *Sigara limitata*, ln = *Hesperocorixa linnaei*, lt = *Sigara lateralis*, ms = *Hesperocorixa moesta*, ng = *S. nigrolineata*, pp = *Glaenocorisa propinqua*, pr = *Callicorixa praeusta*, pt = *Corixa punctata*, pz = *C. panzeri*, sb = *Hesperocorixa sahlbergi*, sc = *Sigara scotti*, sl = *S. selecta*, sm = *S. semistriata*, st = *S. stagnalis*, vn = *S. venusta*, wl = *Callicorixa wollastoni*. Scale lines 1mm.

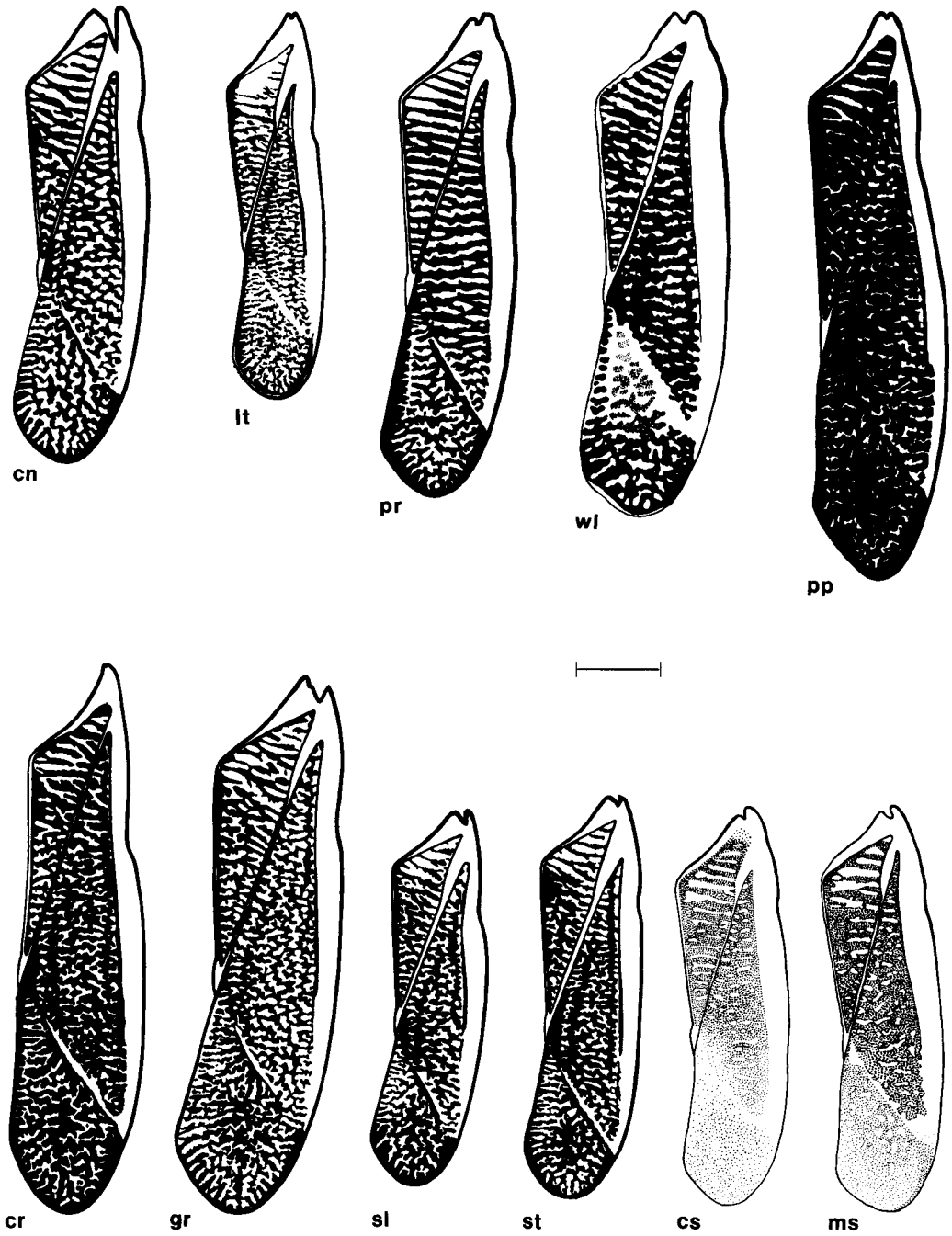


FIG. 3 (contd)

Hemielytral patterns of British Corixidae. af = *Corixa affinis*, bd = *Cymatia bonsdorffii*, cl = *C. coleoptrata*, cn = *Sigara concinna*, cr = *Arctocorisa carinata*, cs = *Hesperocorixa castanea*, dn = *Corixa dentipes*, ds = *Sigara dorsalis*, dt = *S. distincta*, fl = *S. falleni*, fs = *S. fossarum*, gr = *Arctocorisa germari*, lm = *Sigara limitata*, ln = *Hesperocorixa linnaei*, lt = *Sigara lateralis*, ms = *Hesperocorixa moesta*, ng = *S. nigrolineata*, pp = *Glaenocorisa propinqua*, pr = *Callicorixa praeusta*, pt = *Corixa punctata*, pz = *C. panzeri*, sb = *Hesperocorixa sahlbergi*, sc = *Sigara scotti*, sl = *S. selecta*, sm = *S. semistriata*, st = *S. stagnalis*, vn = *S. venusta*, wl = *Callicorixa wollastoni*. Scale lines 1mm.

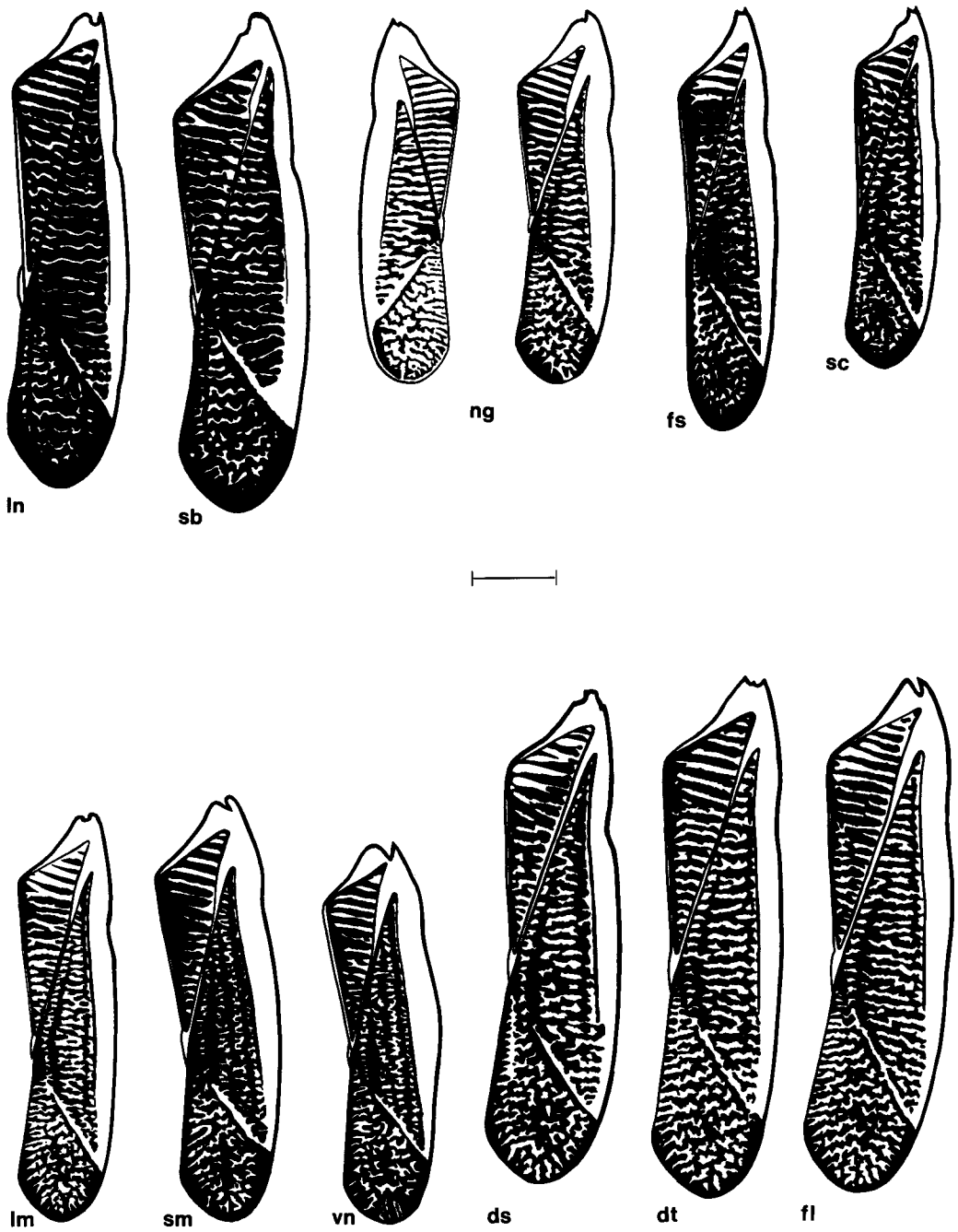


FIG. 3 (concluded)

Hemielytral patterns of British Corixidae. af = *Corixa affinis*, bd = *Cymatia bonsdorffii*, cl = *C. coleoptrata*, cn = *Sigara concinna*, cr = *Arctocorisa carinata*, cs = *Hesperocorixa castanea*, dn = *Corixa dentipes*, ds = *Sigara dorsalis*, dt = *S. distincta*, fl = *S. falleni*, fs = *S. fossarum*, gr = *Arctocorisa germari*, lm = *Sigara limitata*, ln = *Hesperocorixa linnaei*, lt = *Sigara lateralis*, ms = *Hesperocorixa moesta*, ng = *S. nigrolineata*, pp = *Glaenocorisa propinqua*, pr = *Callicorixa praeusta*, pt = *Corixa punctata*, pz = *C. panzeri*, sb = *Hesperocorixa sahlbergi*, sc = *Sigara scotti*, sl = *S. selecta*, sm = *S. semistriata*, st = *S. stagnalis*, vn = *S. venusta*, wl = *Callicorixa wollastoni*. Scale lines 1mm.

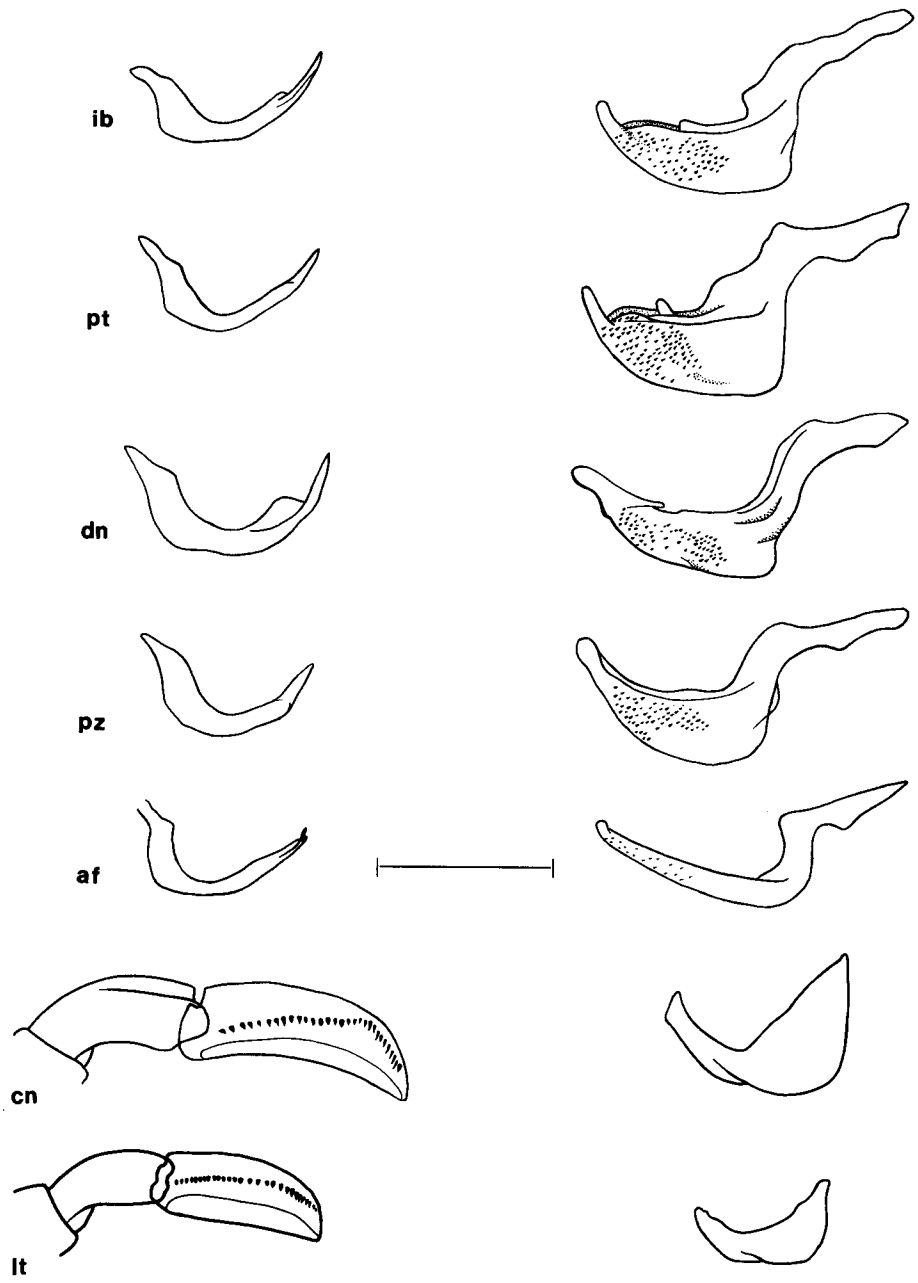


FIG. 4

Anterior view of the pala (fore tarsus) and or parameres of British Corixidae. af = *Corixa affinis*, cn = *Sigara concinna*, cr = *Arctocorisa carinata*, cs = *Hesperocorixa castanea*, dn = *Corixa dentipes*, ds = *Sigara dorsalis*, dt = *S. distincta*, fd = *S. fallenoidea*, fl = *S. falleni*, fs = *S. fossarum*, gr = *Arctocorisa germari*, ib = *Corixa iberica*, lm = *Sigara limitata*, ln = *Hesperocorixa linnaei*, lt = *Sigara lateralis*, ms = *Hesperocorixa moesta*, ng = *S. nigrolineata*, pp = *Glaenocorisa propinqua*, pp c = *G. p. cavifrons*, pp p = *G. p. propinqua*, pr = *Callicorixa praeusta*, pt = *Corixa punctata*, pz = *C. panzeri*, sb = *Hesperocorixa sahlbergi*, sc = *Sigara scotti*, sl = *S. selecta*, sm = *S. semistriata*, sr = *S. striata*, st = *S. stagnalis*, vn = *S. venusta*, wl = *Callicorixa wollastoni*. Scale lines 0·5mm.

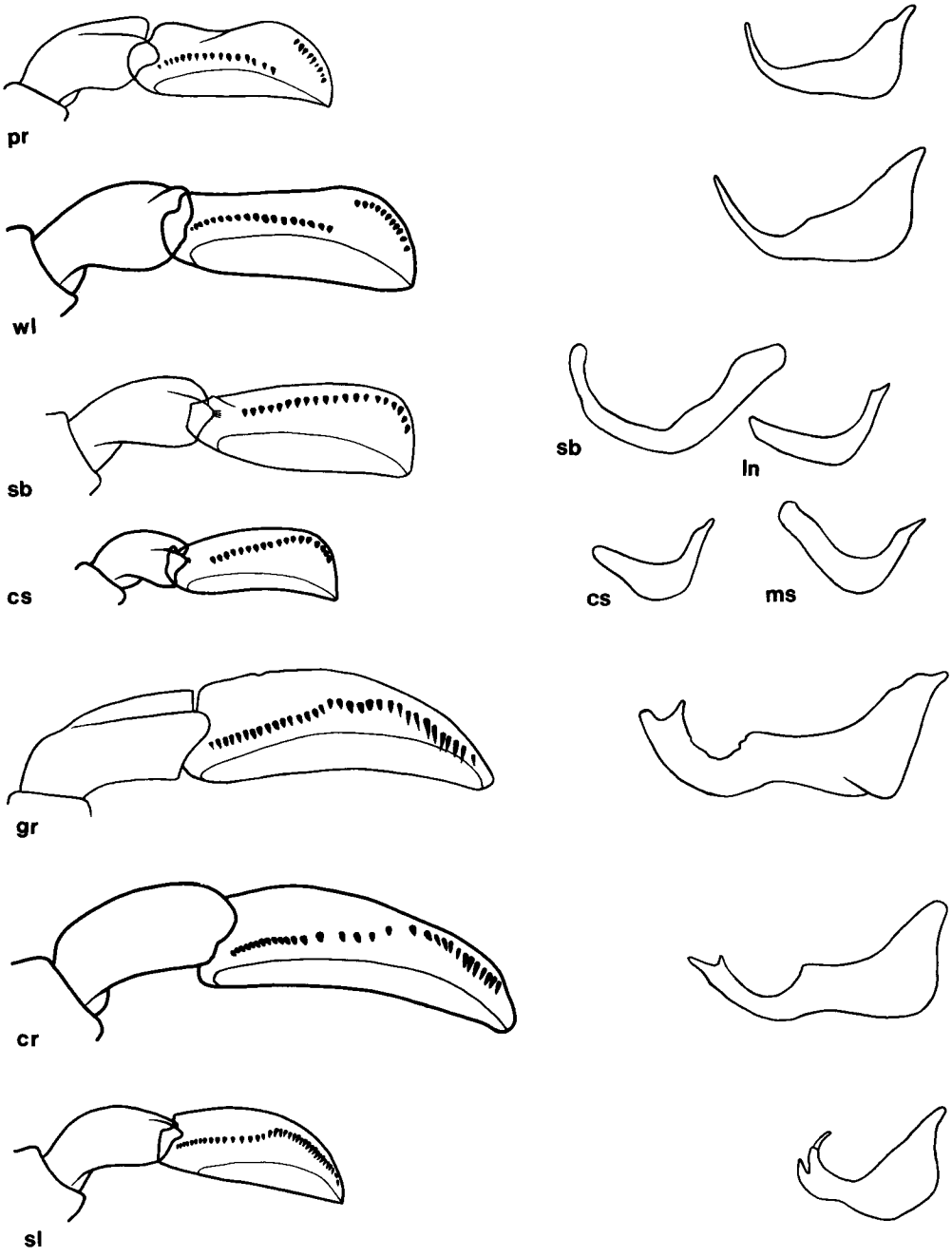


FIG. 4 (contd)

Anterior view of the pala (fore tarsus) and or parameres of British Corixidae. af = *Corixa affinis*, cn = *Sigara concinna*, cr = *Arctocorisa carinata*, cs = *Hesperocorixa castanea*, dn = *Corixa dentipes*, ds = *Sigara dorsalis*, dt = *S. distincta*, fd = *S. fallenoidea*, fl = *S. falleni*, fs = *S. fossarum*, gr = *Arctocorisa germari*, ib = *Corixa iberica*, lm = *Sigara limitata*, ln = *Hesperocorixa linnaei*, lt = *Sigara lateralis*, ms = *Hesperocorixa moesta*, ng = *S. nigrolineata*, pp = *Glaenocorisa propinqua*, pp c = *G. p. cavifrons*, pp p = *G. p. propinqua*, pr = *Callicorixa praeusta*, pt = *Corixa punctata*, pz = *C. panzeri*, sb = *Hesperocorixa sahlbergi*, sc = *Sigara scotti*, sl = *S. selecta*, sm = *S. semistriata*, sr = *S. striata*, st = *S. stagnalis*, vn = *S. venusta*, wl = *Callicorixa wollastoni*. Scale lines 0·5mm.

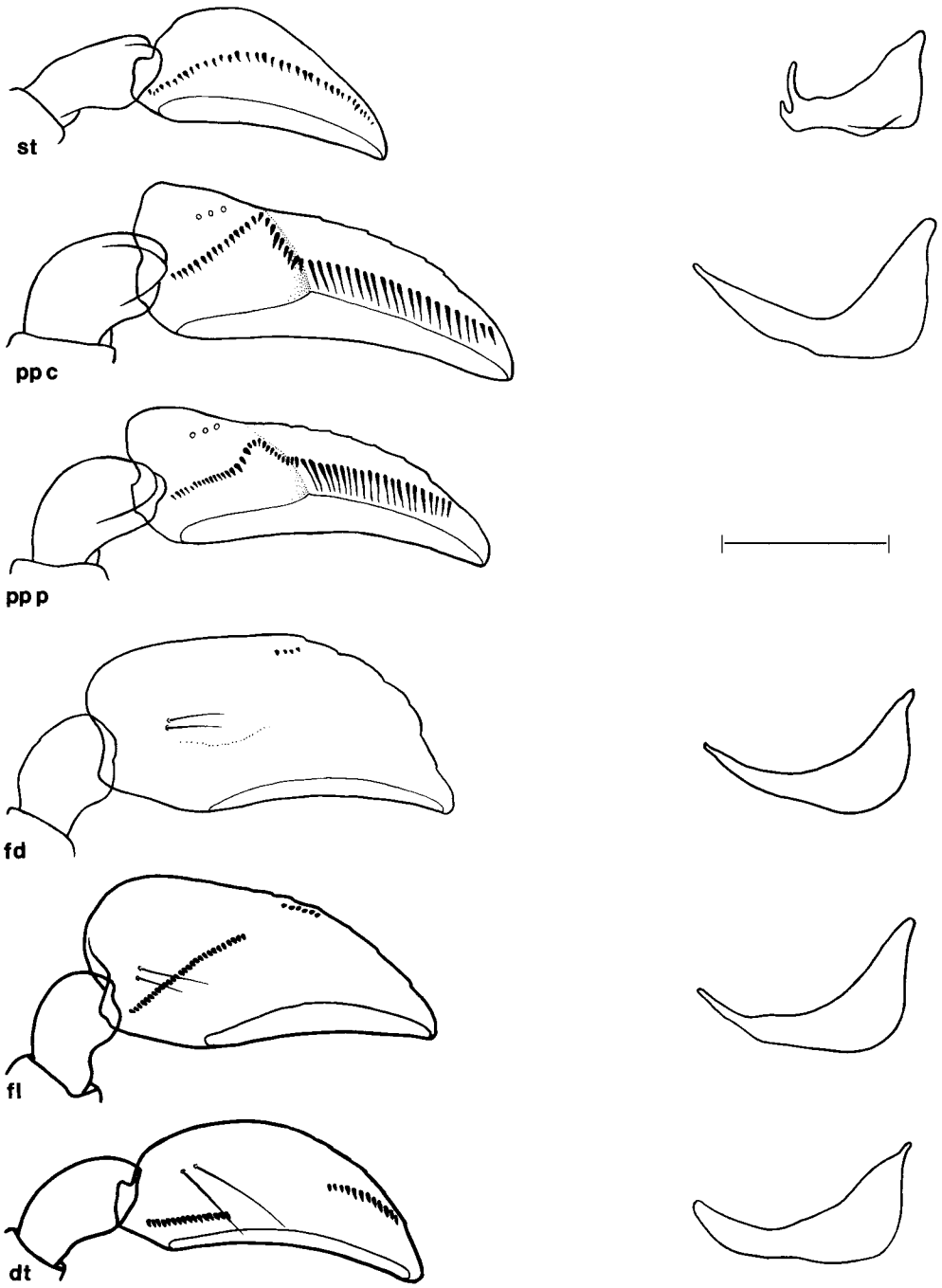


FIG. 4 (contd)

Anterior view of the pala (fore tarsus) and or parameres of British Corixidae. af = *Corixa affinis*, cn = *Sigara concinna*, cr = *Arctocorisa carinata*, cs = *Hesperocorixa castanea*, dn = *Corixa dentipes*, ds = *Sigara dorsalis*, dt = *S. distincta*, fd = *S. fallenoidea*, fl = *S. falleni*, fs = *S. fossarum*, gr = *Arctocorisa germari*, ib = *Corixa iberica*, lm = *Sigara limitata*, ln = *Hesperocorixa linnaei*, lt = *Sigara lateralis*, ms = *Hesperocorixa moesta*, ng = *S. nigrolineata*, pp = *Glaenocorisa propinqua*, pp c = *G. p. cavifrons*, pp p = *G. p. propinqua*, pr = *Callicorixa praeusta*, pt = *Corixa punctata*, pz = *C. panzeri*, sb = *Hesperocorixa sahlbergi*, sc = *Sigara scotti*, sl = *S. selecta*, sm = *S. semistriata*, sr = *S. striata*, st = *S. stagnalis*, vn = *S. venusta*, wl = *Callicorixa wollastoni*. Scale lines 0·5mm.

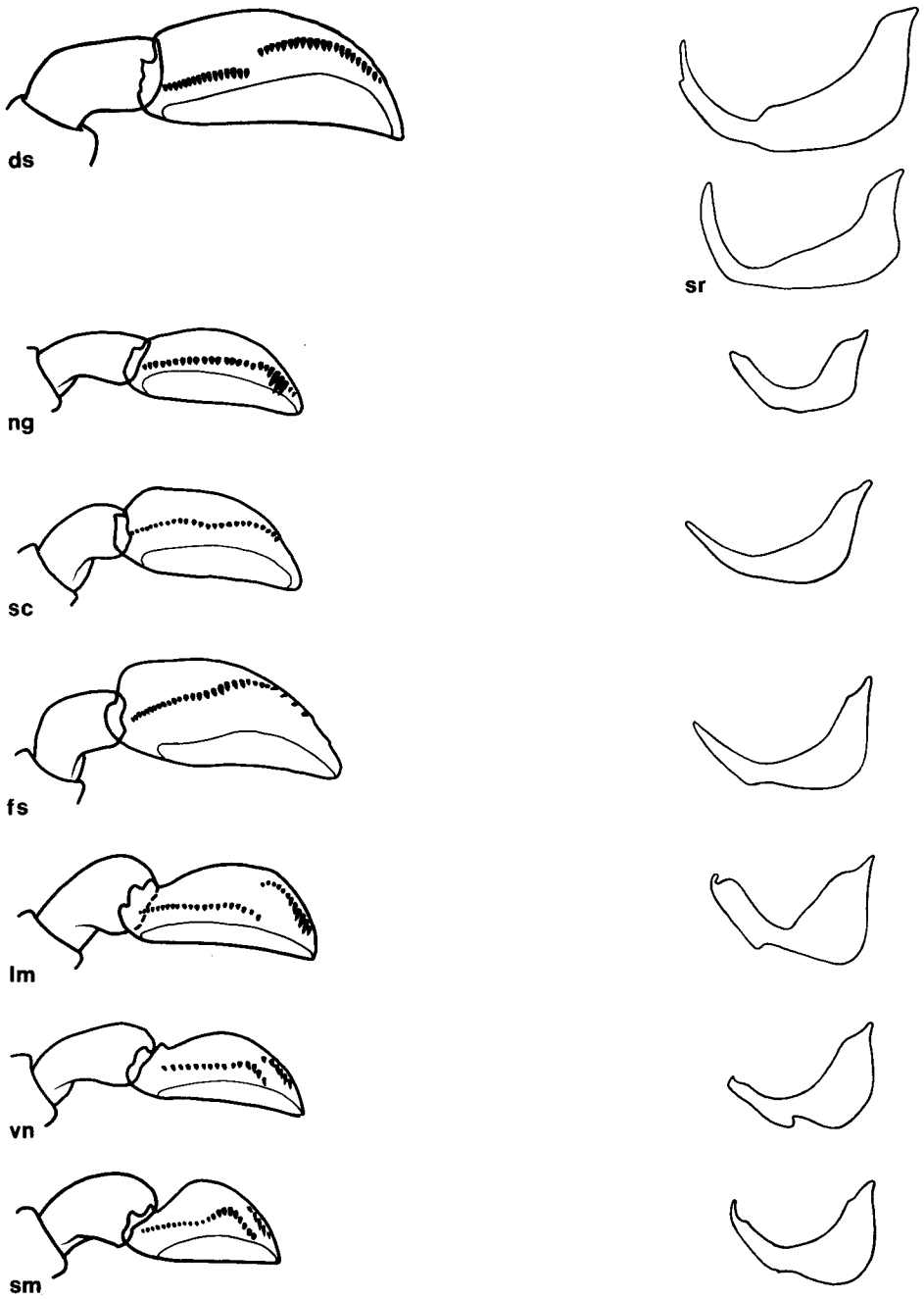


FIG. 4 (contd)

Anterior view of the pala (fore tarsus) and or parameres of British Corixidae. af = *Corixa affinis*, cn = *Sigara concinna*, cr = *Arctocorisa carinata*, cs = *Hesperocorixa castanea*, dn = *Corixa dentipes*, ds = *Sigara dorsalis*, dt = *S. distincta*, fd = *S. fallenoidea*, fl = *S. falleni*, fs = *S. fossarum*, gr = *Arctocorisa germari*, ib = *Corixa iberica*, lm = *Sigara limitata*, ln = *Hesperocorixa linnaei*, lt = *Sigara lateralis*, ms = *Hesperocorixa moesta*, ng = *S. nigrolineata*, pp = *Glaenocorisa propinqua*, pp c = *G. p. cavifrons*, pp p = *G. p. propinqua*, pr = *Callicorixa praeusta*, pt = *Corixa punctata*, pz = *C. panzeri*, sb = *Hesperocorixa sahlbergi*, sc = *Sigara scotti*, sl = *S. selecta*, sm = *S. semistriata*, sr = *S. striata*, st = *S. stagnalis*, vn = *S. venusta*, wl = *Callicorixa wollastoni*. Scale lines 0·5mm.