

Notice on the terms tegula, antitegula, squama and alula, as used in Dipterology,

by

C. R. Osten Sacken.

When we keep the wing of a Dipteron stretched out perpendicularly to the longitudinal axis of the body, and when we follow its posterior margin towards the root, we meet the axillary excision, followed by the alula (*lobulus* Kirby and Stenhammar; Afterlappen Schin.) with which the hyaline portion of the posterior margin ends. Beyond the alula there is a more chitinized and nearly opaque membrane, which connects the alula with the corner of the scutellum. This connecting membrane varies very much in its breadth in different groups of Diptera; generally it is expanded into one or two rounded lobes, which were called squamae by most authors (squama superior and inferior, when there are two of them). The designations superior and inferior are not happily chosen, because they describe the position of the squamae when the wings are folded; when they are expanded, the squamae cease to be superimposed; and it becomes then evident that one of them is fastened to the wing and moves with it, while the other, the true squama, is fastened to the thorax and is stationary. The designation squama superior and inferior was evidently introduced by those who principally studied pinned Diptera.

Anterior and posterior would have been more appropriate expressions. Whenever the true (posterior) squama is rudimentary (as for instance in the *Nemocera*), it was considered by describers as non-existing. The anterior squama, fastened to the wing, in such a case, remained without a name, and was generally overlooked, although it affords very good descriptive characters. I confess myself guilty of this negligence in my writings on Tipulidae, and it is only lately (1892) that I became aware of this omission, and introduced, for the anterior squama, an independent name (antitegula).

In German, these squamae were always called Schuppen or Schüppchen, which is a translation of squama, or squamula.

In French, Réaumur (IV, p. 280, Tab. XIX, Fig. 9 nn.; IV, p. 572, Tab. 38, Fig. 6e) called them ailerons or coquilles. Geoffroy (II, p. 436, 1762) calls them aileron, which he compares to the hollow part of a spoon, called in French cuilleron. The latter term was adopted by the later French authors, Latreille (Précis 1796), Robineau Desvoidy (Myodaires, p. 16, 1830), Macquart (H. Nat. Dipt. I, p. 4, 1834), and others. R. Desvoidy says: „je conserve à ce double appareil le nom français de cuillerons, mais je le traduis en latin par le mot calypta, de calypto, je couvre, tandis que je désigne par les mots squama superior et squama inférieur les deux squames qui le composent." (The same in the Hist. des Dipt. d. Env. de Paris I, p. 77, 1863.)

Thus Robineau has a double nomenclature for these organs: he calls them cuillerons (calypta) when both are considered together, and squame (squama) when they are taken separately.

Squama or squamula was the term almost universally used. It is found in Linné (XII. edit. p. 969, 1766) as squamula. Fabricius, Fallén, Meigen, Zetterstedt, Erichson (die Henopier), Schiner, all have squama. Illiger, Terminologie (1800, No. 1818) has squama halterum. In England Harris (1782), Fig. 4e, calls them femoral scales; Curtis — squamula (Comp. Brit. Ins. Dipt. under *Henops*, *Oestrus* etc.). In America Say, Am. Ent. I, p. 155, (1824) in the Explanation of terms has squama, scale.

It is a matter of regret that later English authors did not follow Harris and Curtis in using the quite appropriate term squama. The introduction of alulae or winglets is apparently due to Kirby and Spence (Introduct. etc. II, p. 360, 1817, winglets; III, p. 625, alulae or winglets; the Orismology in Vol. IV does not contain any term for these organs). In the choice of the term, these authors may have been influenced by the term aileron of Geoffroy, 1762 (comp. above). Haliday (Ent. Mag. IV, p. 149, 1836) has the term calyptra, perhaps under the influence of Robineau-Desvoidy; but when he takes them separately, he distinguishes the interior and the exterior auricle (Entom. Mag. III, p. 318, 1836). But later (Nat. Hist. Rev. 1855, p. 55) he adopts the term alulae. Westwood (Intr. II, p. 500, 1840) has alulets. Rondani uses the term caliptera. Walker (List Dipt. Brit. Mus. V, p. 1, 1854) gives a figure of a wing in which the lower squamule is called subscutellar winglet, the upper one subaxillary winglet. In the Ins. Brit. Diptera Walker always uses the term alula.

Loew, in his German letterpress, always uses the ordinary terms Schuppen, or, more often Schüppchen (scales), and it is very strange that in Latin he does not use the corresponding word squamae. He has tegulae instead (most probably by mere inadvertence). The earliest appearance of this term I find in Stett. Ent. Z. 1844, p. 326, footnote, where Loew says: „I call alula the lobe which exists in most Diptera on the posterior margin of the wings, near the root, and not the covering-scales of the halteres (tegulae), nor the stripe which generally runs from the root of the wing to the scutellum, and which may be called frenulum.“ The same terminology was adopted by Loew in the Monogr. N.-A. Dipt. I, p. XIV (1862). In editing that volume I had, of course, no right to change Loew's terminology, but I took the liberty, in the footnote of the same page, to remark: „Some authors call them squamae. — O. S.“ If, at that time, I had been as well informed on the merits of the case as I am now, I would have probably protested against this arbitrary change.¹⁾ As it was, I had to follow suit, and have used the term *tegula* ever since. But in my recent writings I felt the want of a separate term for the anterior *tegula*, in cases when the posterior one was rudimentary, that is, in the shape of a mere connecting membrane (frenulum of Loew), and I called it *antitegula*. It would have been improper to call it anterior *tegula*, because it has no poiser to cover, as the term *tegula* implies covering. (Weinland, Beitr. z. Kenntn. d. Baues des Dipteren-Schwingers, Berlin 1890, p. 16, calls the *antitegula*, Verbindungsschüppchen.)

What Loew calls *alula* (Afterlappen Schin., Fauna, Vol. I, p. XIV) is the part of the wing, separated from the anal angle (Flügelappen Schin.) by the axillary incision (Réaumur IV, p. 280, Tab. 19, fig. 11, describes the latter as: „une entaille; là il semble qu'une petite aile soit sondée à une grande“). The application of the term *alula* in this sense is certainly more appropriate to the object thus named, than its use in the sense of *squama* (*tegula* Loew). I have not succeeded in ascertaining where Loew found *alula* used in this sense. Schiner (l. c.) does not give any latin equivalent for his Afterlappen and Flügelappen. Kirby²⁾ and Stenhammar (Ephydr. 1844, p. 117) call this part of the wing *lobulus*; Haliday (Brit. Hydrom. in Ann. N. H. III, June 1839,

¹⁾ Schiner, Fauna I, p. XIV, footnote, insists on *squama* instead of *tegula*.

²⁾ In my notes I find the term *lobulus* referred to Kirby, but I cannot find the exact reference at present.

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p. 219) and Walker, probably follow Stenhammar, in calling it axillary lobe.

If, some time or other, a reform of the nomenclature of the terms discussed by me should be attempted, I would recommend squamae, in the plural, as a designation for both of these organs taken together; squama, in the singular, would mean the posterior squama alone;¹⁾ and antisquama the anterior squama alone; the strip of membrane running in some cases between them, or connecting the squama with the scutellum, should be called the connecting membrane. Alula would be the name for the lobus and lobulus of Stenhammar and Haliday; it is preferable, because the latter are general terms which may be used in other connections.²⁾

However, until these changes are generally adopted, I shall use tegula and antitegula, as I have done before.

Hitherto, the group of characters in question has been very little used for descriptive purposes. Tegulae have been noticed principally in the Muscidae Calyptratae, where they can be easily perceived even in dried specimens; but, in many families they offer a variety of structures, as soon as we study them in fresh specimens, or take the trouble to soften dried ones by moisture.

The present paper is the result of a compilation which I made in 1891, before introducing the term antitegula; I publish it in the hope of saving some labour to those who may be interested in the same subject.



¹⁾ Weinland always mentions the squama (Schüppchen) in the singular, meaning the posterior squama (Weinl. l. c., p. 16—17.

²⁾ I am aware that Comstock (Manual. etc., p. 421, 1895) is just of the opposite opinion: „The terms alula and alulet are also often misapplied, being used to designate the posterior lobe of the wing,“ but it seems to me that in this case he is mistaken.

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Zeitschrift/Journal: [Berliner Entomologische Zeitschrift](#)

Jahr/Year: 1895

Band/Volume: [41](#)

Autor(en)/Author(s): Sacken C. R. Osten

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