

Translation: Die Lonchopteren des palaearktischen Gebiet. von Dr J.C.H. De Meijere (Hilversum). Mit Tafel 4 und 5.

The *Lonchoptera* of the Palaearctic area. by Dr J.C.H. De Meijere (Hilversum). With plates 4 and 5.

The identification of the Lonchoptera species is still associated with significant difficulties. This is caused by various issues, some of which are due to nature itself and partly to the authors. Some of the species look very similar to one another, and the initially very noticeable differences in colouration emerge on closer examination of numerous specimens as being of little use for differentiation. Some of the most common species in particular show lighter, mostly yellow, sometimes dark grey forms, with all sorts of transitions in between, and thus form almost parallel rows of colours, which has caused great confusion in a genus where the species were mostly inclined to separate according to colour. As late as 1899 Bezzi thought that the differences in this genus were reduced almost to the colours, since the setae in the species are similar. The colours, however, are highly variable; I hardly believe that they change a lot after death, as Schiner thinks.

Certainly there is no excess of variable features either. Strobl separated the species into 2 groups, depending on the relative length of the anal vein, opposite the fork point of the 4th elongation vein. For some individuals this gives a very useful characteristic; in most species, however, this character is not quite constant, so that a sharp boundary cannot be drawn here, and the use of this characteristic in the determination requires great caution.

I find better, more constant features in the bristling of the legs, especially the front femora and tibiae. Then, strangely enough, despite all the colour difference, the colour of the vertical setae and the upper postorbital setae were of great importance, and to a lesser extent the number of black epistomal setae. The size and formation of the hypopygium is also important; of one of the common species, however, male are, unfortunately, extremely rare.

The determination of the species already described caused considerable difficulties. It would have been impossible for me at all if I had not been able to examine typical specimens from various quarters with great kindness. I would like to take this opportunity to thank Messrs. Bouvier and Künckel d'Herculais in Paris, Bezzi in Turin, Aurivillius in Stockholm, Bengtsson in Lund, Sintenis in Dorpat, Strobl in Admont, Stein in Genthin, Kertész in Budapest for their valuable support represent.

Meigen was not happy with the treatment of this genus. It is no wonder that several of his species are not properly recognized by later researchers. Several of these are synonyms, and the corresponding specimens are not even different by colour or other characteristics. In fact, among the types of his 10 species there are no more than 4 different ones. Several researchers have already expressed the opinion that synonyms were found among Meigen's species, but the various researchers differ greatly in their conception of these synonyms.

According to Walker¹, *flavicauda* [Mg] = *riparia* [Mg] = *rivalis*? [Mg]; *lacustris* [Mg] = *palustris*? [Mg]; *nigrimana* [Mg] = *thoracica*? [Mg];

¹ Walker, List Dipt. Brit. Mus. I. p. 668.

[of these all = *lutea* Pz except *rivalis*? [Mg] & *lacustris* [Mg] which = *bifurcata* Fallén]

according to Schiner², *rivalis* [Mg] = *lutea* [Pz]; *riparia* [Mg], *thoracica* [Mg] = *flavicauda* [Mg]; *riparia* maybe identical to *trilineata* Zett.;

[of these all = *lutea* Pz except *rivalis*? [Mg] which = *bifurcata* Fallén]

according to Sintenis³, *thoracica* [Mg] = *lutea* [Pz]; *nigrimana* [Mg] = *palustris* [Mg]; *riparia* [Mg] = *lacustris* [Mg];

[of these all = *lutea* Pz except *rivalis*? [Mg] & *lacustris* [Mg] which = *bifurcata* Fallén]

according to Strobl⁴, *punctum* [Mg] = *thoracica* [Mg] = *rivalis* [Mg].

[of these all *punctum* [Mg] = *thoracica* [Mg] = *lutea* Pz; *rivalis*? [Mg] = *bifurcata* Fallén]

After examining many British specimens, Verrall⁵ came to the conclusion that apart from a few *L. fuscipennis* Boh. all others belong to only one and the same very variable species.

On the other hand, from Meigen similar coloured forms of different species are grouped under the same species name. The material that was kindly sent to me has shown that today's Dipterologists interpret the same species very differently. I have only mentioned this under the synonyms if I have been able to acquire certainty through dissection.

The body bristling was already mentioned by Bezzi, in the description of *L. pictipennis*. On the forehead there are two pairs of frontal orbital setae, those of the anterior pair are close together in the middle, at a short distance from the antennae, the rear pair in the same transverse row as the rear ocellars; the 2 ocellar setae can be found on the ocellar triangle.

Immediately at the rear edge of the forehead there are 4 vertical setae whose colour, especially that of the inner pair, is important for the system; The postocular row are attached to the outside; the back of the head bears in its upper half 2 only slightly converging post-vertical setae. One observes 12-14 epistomal setae, of which the two crossed middle ones are to be called the vibrissae.

The thorax shows 1 humeral, 2 posthumeral, 1 presutural, 1 notopleural, 3 supraalar, 1 tiny preeutellar and 3 dorsocentral setae on each side; there is often a tiny setula immediately in front of the foremost. In addition, there is a small seta at the front of the thorax on each side. Scutellum with 2 setae on the edge, pleurites seta-free.

The abdomen shows at most weak and short setae in front of the segmental margins.

The chaetotaxy of the legs is different for the species. The long forelegs usually show one or a few longer setae in front. On the fore legs, those lying at the very top are particularly important; moreover, some are usually found on the anterior and posterior sides near the tip. The middle femora often have characteristic setae on the underside of the males; on the other hand that of the hind legs seems to me hardly different in the species. Sexual and specific differences can be found in the chaetotaxy of the front tibiae, and also sometimes in the middle tibiae, but I hardly observed any differences in the back tibiae.

² Schiner, Fauna austriaca. I. p. 244.

³ Sintenis, Sitz. ber. naturf. Gesellsch. Dorpat. IX. 3. 1891. p. 476.

⁴ Strobl, Mittheil. Verein Steiermark. 1892 (1893). p. 156.

⁵ Verrall, A second hundred new British species of Diptera. Entom. monthl. Mag. (2) V. 1894. p. 141.

The construction of the hypopygium is also particularly important for the system, although it comes into little consideration for purposes of determination, because of the peculiarities that can in part only be perceived microscopically. But the same thing provides important support for my conception of the species, especially with regard to the various forms of *L. lutea*, because it was found that here all the degrees of colour completely coincide in the construction of the hypopygium. In dispensing with a more in-depth comparative-morphological consideration of the parts that make up the hypopygium, I would only like to mention the following here. On the abdomen of the male, 5 segments are visible above, of which the anterior one is by far the longest. The 5th carries the hypopygium turned downwards. It consists of the basal phalanx (*lamina basalis*) and the anal segment with the upper lamella (*forceps superior* in Schnabl); the penis and two pairs of gonapophyses can be distinguished on the underside. Figures 5-18 will show the great diversity of parts in the species. The upper lamella of the anus segment is incised more or less deeply, in *L. fallax* it is relatively largest, in *L. strobli* it is very short. On the underside of this segment there is a different appendix at the base: in *L. pictipennis* a small plate that ends in 4 curved hooks, in *L. tristis* 4 setae, in *L. strobli* 2 setae, in *L. lutea* a membranous two-horned plate.

The posterior gonapophyses are mostly irregular, rod-shaped structures, curved at the end and provided with a flap on the outside; in *L. fallax* they are expanded like a leaf before the end, the curved tip is provided with teeth; the anterior gonapophyses are strongest in *L. fallax*, where they are long and narrow and have two larger, curved setae at the end. In the other species they are mostly poorly developed, but their setae are all the larger; in *L. pictipennis* they each have 1 very strong setae, in *L. strobli* 2, in *L. tristis* a peculiarly curved and widened seta.

In *L. fallax* the penile structure is strongly developed; in *L. lutea* it is less developed. I had only one male of *L. furcata* at my disposal, so that I could not determine the exact structure. Only a pair of short hairy lobules seem to have remained from the anterior gonapophyses. The large lobes at the end seem to me to represent the posterior gonapophyses. In this species, as well as in *L. scutellata*, the hypopygium is characterised by its small size. While in the others it protrudes freely below, in these two it is more or less hidden under the lateral edges of the last abdominal segments.

In general there is great agreement between *L. tristis*, *L. strobli*, and *L. pictipennis* in the structure of the hypopygium; *L. lutea*, *L. fallax* and *L. furcata* are more isolated. Whether the hypopygium of *L. scutellata* resembles that of *L. furcata*, which can be presumed, I cannot say, since I naturally had to spare the only known male of the same.

The last four tarsomeres of the forelegs are relatively shorter and wider in the male than in the female. In addition, in the dry specimens they are usually more or less rolled up, as Bezzi has already observed. The [comparative lengths of tarsomeres of the](#) metatarsus are e.g. 35: 20: 15: 11: 12 for the f of *L. lutea*, and 35: 12: 12: 10: 11 for the male. Moreover, the male is characterised by the fact that there are 2 stronger setae at the end of the 2nd tarsomere and that the base of the 3rd is equipped with 3 very thick, blunt, short setae. The same condition can also be found in the other species; sometimes in *L. tristis*, the setae of the 3rd tarsomere are club-shaped at the end. (Fig.1).

A very remarkable fact is the great rarity of the males of *L. furcata*, which has also been noticed by several other researchers. Strobl caught "only one male out of 100 specimens"; Stein informed me: "I caught an infinite number of females from *L. lutea* (this is how he describes this species), but only one male". I didn't fare any better either; in spite of the fact that I have collected a large number of specimens, I only own a single male; it is quite light in colour. The males, which Zetterstedt described as *L. impicta*, is almost the same colour, while from Strobl I had a dark male, probably belonging to the

same species (August). The latter author also criticises in his *Dipteren von Steiermark* for "L. tristis" (= the darkest form of *furcata*) (p. 157): " ♂ ♀ [collected] around Melk [48°14'N 15°21'E] in May".

If one compares this with the condition in *L. lutea*, which is also common, of whose various forms one can easily collect numerous males, then the assumption arises that in *L. furcata* the males do not play an important role, and reproduction as a rule will be a parthenogenetic. In the case of difficult breeding, the matter is difficult to decide experimentally, but the above assumption is made almost certain by the nature of the *receptacula seminis*.

In the various forms of *L. lutea*, they appear as 2 very long, thin tubes of approx. 4 mm. long, of consistent width; only the part closest to the vagina is expanded like a tube; they open close to each other in the same (Fig. 2). The upper end is covered with larger cells for a distance.

In *L. furcata* the main structure is the same, but the tubes are extremely shorter (Fig. 3). They are only about 0.7-1 mm long and curved like a hook; light and dark shapes look the same here. Given that the species are almost the same size, this condition can only be explained by the fact that we are dealing with rudimentary structures. I never found spermatozoa in these short tubes, whereas they are often observed in the long ones of *L. lutea*; they are then found in the whole tube, also in the inner end part.

I don't see any difference in the ovaries of either type. Each ovary consists of approx. 10 egg tubes, each with up to 10 egg chambers.

Parthenogenesis is known to be fairly widespread in insects. There are cases in which it takes place only in exceptional cases, when copulation is deliberately prevented, as in several lepidopterans, and also in cases where it is connected with heterogony, as in aphids. As a normal phenomenon, that is, in the way that it presumably applies to *L. furcata*, it is found in particular in sawfly, gall wasps and phasmids. In the rarity of the males there are all sorts of degrees in these cases, soon the same are not even found, like e.g. in the phasmids *Bacillus gallicus*, *Eurytenema herculeana*, in several sawfly, in *Cynips kollari*, soon they are extremely rare, as in *Bacillus rossii*, in the sawfly *Eriocera ovata*, in the beetle *Adowus vitis* F. etc.

Recently, Wassiliew⁶ mentions a case of parthenogenesis in the parasitic wasp *Telenomus*. The same occurs here occasionally. Since the females are far more numerous during sexual reproduction in the brood, but only males develop from the parthenogenetic eggs, the unequal number of sexes is balanced out by parthenogenesis. Parthenogenesis has recently been recorded for psocids as well, namely in *Ectopsocus briggsi* Mac.Lachl. var. *meridionalis* Rib. Sexual reproduction must be very rare according to Ribaga⁷, since he has never observed males of the species in question.

Such cases have not yet been observed in Diptera. It is well known that in some cecidomyids (*Miastor*, *Oligarces*, *Pero*) paedogenesis takes place, but again alternating with a gender generation. A *Chironomus*-pupa laying eggs is also reported. According to Kellogg's communication, parthenogenesis should take place in isolated cases in *Culex*. The larvae that emerged from the laid eggs perished before pupation, however⁸.

Views still differ widely about the position of the lonchopterids in the system.

⁶ Wassiliew. Ueber Parthenogenesis bei den Arten der Schlupfwespengattung *Telenomus*. Zool, Anz, Bd, 27 N°. 18. 1904.

⁷ Ribaga. La parthenogenesi nei copeognati Redia, II, fase, 1. 1904 p. 33.

⁸ Lühe. Zur Frage der Parthenogenesis bei Culiciden. Ally. Zeitsehr. f, Entomol. VIII 1903 p. 372.
Kellog. Parthenogenese der Moskitos, ibid. IX. 1904, p. 59.

The Lonchoptera have often been associated with dolichopodids, but head formation has definitely not given any arguments for this. The *Lonchoptera* head bears a great resemblance to the head of a cyclorrhaphic fly. One thing must be particularly noticeable, namely the position of the anterior frontal orbital setae, which are to be found very closely above the antennae. I believe this peculiarity suggests that the peri-orbital [sclerites], which are the source of these setae, are still very tight, so that the whole forehead is formed by the two peri-orbital [sclerites] and the vertical triangle enclosed between them at the back. Even with the female of *Platypeza*, no special peri-orbital [sclerite] can be seen in the forehead next to the eyes, the whole forehead is probably formed here also with the exception of the vertex triangle by the peri-orbital [sclerites]; this only becomes doubtful here because there are no setae here. I have not been able to examine females from *Callimyia*, but the figure of Verrall suggests that the condition is the same here, as here too the forehead does not show a central part of special quality, but it is completely silver-white, likewise with *Opetia* female, completely shiny black, in both forms [sexes?] with some frontal orbital setae, which are not so close to the median line.

There is evidently a primitive condition similar to the *Eumyids*. The formation of the softer, median, front part of the head is probably related to the formation of the frontal swelling. As a result, the peri-orbital [sclerites] were pushed apart and probably gradually narrower, later they were more and more shortened in front and are finally only formed at the apex. So the schizometopic condition is probably older than the holometopic.

The veins of Lonchoptera have always been difficult to interpret. Schiner says of the same: 'The vein has the peculiarity that the 4th longitudinal vein arises from the 5th, however not in front of or above, but behind the basal cell, almost on the middle of the wing; one could also say that the 4th longitudinal vein is completely missing, but that the 5th is forked twice; Through this formation the common transverse vein has also moved close to the wing-base, and is not located above the discoidal cell, which is completely absent here, but above the posterior basal cell. If the usual transverse vein were thought to be vertical, but the origin of the 4th longitudinal vein in the vicinity of the wing-base, the vein course would be a completely normal one. The latter is true, however, such a shift of the point of origin to the upper branch of the 5th is sporadic and is hardly acceptable, even less a 5th straight line bifurcated twice.

Brauer⁹ did not deal with that of the *Lonchoptera* in his treatise on the wing veins of the Diptera, because the same thing seemed to him to have been insufficiently explained.

Even Adolph¹⁰ was unable to find his way completely in the lonchopteran venation. According to him, the transverse vein between the 3rd longitudinal vein and the anterior basal cell would perhaps be the remainder of its longitudinal vein IIIb or IVb of the anterior field. He does not emphasise closer correspondence with any other family. In general, his method of keeping the veins of concave and convex strictly apart and to regard them as fundamentally different gives rise to very constrained conceptions. The dipteran veins are probably not composed as differently as it should be according to his views.

After a closer comparison of the related families that may be considered, I consider the view to be justified that the upper boundary of the discoidal cell, from the small cross vein [r-m] to the tip of the discoidal cell, has been lost (Fig. 4). A parallel case can be found in *Pipunculus omissinervis* Beck., Where the discoidal cell is open in the same place. As far as the cross vein between the 3rd longitudinal vein and the rear basal cell in *Lonchoptera* is concerned, this is to be understood as the small cross vein + the distal part of the

⁹ Brauer. Zweifl. k. Mus. Wien. Denkschr. math. naturw. Cl. Akad. Wiss. Wien. XLIV.

¹⁰ Adolph. Die Dipterenflügel. Nov. act. Leop. Carol. Deutsch, Ak, Naturf. XLVIL. Nr 6. 1885 p. 287.

upper limit of the discoidal cell, where the corner at its junction has gradually blurred. The dotted line in Fig. 4 would thus complete the veins. But then one obtains a vein which, apart from the length ratios of the vein sections, basically looks very similar to that of *Empis* on the one hand and that of *Platypeza* on the other, as can be seen from Fig. 4. Even in the convexity, and respectively the concavity of the veins, according to Adolph's theory, is the desired match. I would like to emphasise here that there is basically no great difference between the veins of *Empis* and *Platypeza*; they differ from each other especially in that the two upper veins arise separately from the discoidal cell in *Empis*, while in *Platypeza* they are connected at the root. A similar connection between two such cores can be found e.g. also with *Tipula*, with respect to *Pachyrrhina*; in *Beris vallata* the two upper veins from the discoidal cell are sometimes separated, and sometimes they form a short-stalked fork. In the empids they are mostly separated, but here, too, a fusion sometimes occurs, for example in *Hemerodromia precatória*, where they form a rather long-stalked fork. While Coquillett¹¹ asserts that the *Lonchoptera* are to be included among the orthorrhaphs because of their 4 posterior marginal cells, while the cyclorrhaphs never show that many, I would like to emphasize that *Platypeza* also contains 3, although the lower prong of the fork under the wing tip does not completely reach the edge.

The last longitudinal vein is also remarkable. For the most part it is clearly convex and, like the other convex parts of the veins of *Lonchoptera*, is equipped with branches. Accordingly, according to Adolph, it cannot be the concave anal vein, but he regards it as an axillary vein precisely because of this convexity. I don't think I should follow him here. On the one hand, such a sharp, fundamental separation of the two types of veins, as directed by Adolph, has generally shown itself to be inadmissible, so that a convex vein can probably be phylogenetically derived from a concave. In Adolph's figures, too, there are cases where a concave vein becomes convex near the edge of the wing, which he then interprets as the transition of the vein to an adjacent convex line. Rather, I believe that a simple change in nature has probably taken place in connection with mechanical needs. In *Empis*, too, the last section of the anal vein is convex, with several acalyptates, such as e.g. in *Dryomyza*, this is, also according to Adolph, the case to an even greater extent. The same thing may have taken place here as a concomitant of the peculiar wing shape of *Lonchoptera*. In any case, it is remarkable that this vein looks almost concave at the base, in the first half of the anal cell, and is devoid of setae. The point of origin of this vein clearly lies in front of the base of the lower basal cell in *Lonchoptera*, as is often the case for the anal vein of the lower Diptera, for example in *Tipula*, *Empis*; in *Hemerodromia precatória* the clearly concave anal vein arises far in front of this base, while in the higher Diptera, also in *Callimyia*, *Platypeza* and *Pipunculus*, the origin usually takes place under this base, and the axillary vein then arises further towards the root.

As far as Coquillett's other objections are concerned, these do not seem particularly valid to me either. An apical antenna setae is also found in the Aschiza, for example in the Platypezines, which are particularly considered here. As far as the rather strong setae of the body are concerned, Coquillett compares *Lonchoptera* on the one hand with Asilidae and on the other hand with Syrphidae, and thinks that in this characteristic they are closer to the former. This is not how the question can be decided. In general, however, the setae of the Ashiza that are to be considered here are not very well developed e.g. with *Opetia* more important; the female of these show, as well as that of *Callimyia*, frontal orbital setae. I do not bring *Lonchoptera* into very close contact with the Syrphidae either. The Phoridae, which are also heavily setad, also with apical antenna setae, are also placed by Coquillett among the Cyclorrapha.

¹¹ Coquillett. A systematic arrangement of the families of the Diptera. Proc. U.S. Nat. Museum, XIII. p. 656.

I would like to point out the peculiar chaetotaxy of the longitudinal wing vein. Such general setation of all convex veins, as here, is found only in exceptional cases. In the Phoridae and *Callimyia*, too, the anterior convex longitudinal veins are partly provided with setae, so that here too there are connections to those forms with which I would like to consider them initially as related. I would also like to point out the formation of the apex of the tarsus, of which I have proven that both *Lonchoptera* and *Platypeza* differ in the absence of the empodium¹². In Pipunculidae the lobule is small, in Empidae it is sometimes quite small, sometimes strongly developed, while the Syrphidae have a well-developed sole process like the Eumyids.

In this context it is also important to mention that based on mouth parts *Lonchoptera* belongs to the Ccycloirapha, as is evident from the detailed related investigations of Wesche. He brings this genus to his 5th group, next to *Pipunculus*, the schizometopes and some families of holometopes, including the Cordyluridae (= Scatomyzidae), while the Empids show a completely different condition¹³.

After examining an extensive amount of material, I come to the assumption of the following types: *L. lutea* Panz., *L. furcata* Fall., *L. tristis* Meig., *L. scutellata* Stein, *L. pictipennis* Bezzi, *L. fallax* n. sp. and *L. strobli* n. sp. Of these, *L. lutea* and *L. furcata* are by far the most common, they are very variable in colour, but the rest are almost constant; however, only one pair of *L. scutellata* is known. *L. fuscipennis* Boh. is a synonym of *L. tristis* Meig., otherwise most of the other previously published species are synonyms of *L. lutea* and *L. furcata*; often the same colour grades of both species are found mixed.

That of Panzer as *L. lutea* Meig. *i. litt.* pictured a completely yellow male. Of the 3 different species that I find in Meigen's collection as *L. lutea*, this condition only applies to one; the Panzer name must be retained for these. Actually, the outermost base of the abdomen is still dark in the males of the same, but this is often very little noticeable when viewed from above, so that such light specimens really correspond to Panzer's image. Whether the depiction of the female, which is supposed to be characterised by a black longitudinal line on the thorax and abdomen, really relates to the same species cannot be decided; it may just as well be a female of *L. furcata* according to my interpretation. In the figure, the end of the anal vein is below in the female, and in front of the fork point of the 4th longitudinal vein in the male, which, however, is better with *L. lutea*. As a rule, however, the abdomen is more darkened in the female of *L. lutea*.

I was able to examine 4 typical specimens of Fallén's type *Dipsa furcata*, 3 from the collection of the Reichsmuseum in Stockholm, 1 from the Meigen's collection. Meigen had already recognized that this was a mixed species, which I can only confirm. 1 of the Stockholm copies is correct with Meigen's *L. lutea* male; it has a narrow thoracic fascia, the abdomen a very broad longitudinal fascia, the back of the head is completely yellow. The other two specimens are almost equally coloured specimens of *L. lutea*, with a yellow abdomen only on the sides (one specimen is completely missing the abdomen), while Meigen's specimen is darker, and of the latter as a special species (*L. palustris*), but also belongs to *L. lutea*. The Fallén's name can therefore be retained for the species to which the 8 female *L. lutea* of Meig. belong.

I was particularly pleased that I was able to examine Meigen's types thanks to the liberality of the board of the Paris Museum. All carry the round label from the Meigen

¹² De Meijere. Ueber das letzte Beinglied bei den Arthropoden. Zool. Jahrb. XIV. 1901. p. 444.

¹³ I am pleased to be able to note here that Lameerer, in accordance with my views, in his recently published treatise: Notes pour la Classification des Diptères (Mém. Soc. Entom. Belgique XII. 1906. p. 133) as Cycloiraphen, especially regarded as the closest relative of the Platypezides.

collection; all except for the only *L. lutea* male, 2 *L. lutea* females and an *L. rivalis* male, which also bear the square label with Meigen's handwriting.

The result was the following:

L. lutea, there are 3 species included here, one of which is female, which is labeled as male, with the species which, according to Panzer's figure, must be interpreted as *L. lutea*, it is yellow, almost without thoracic medial fascia, the abdomen is only darker at the base. Three females of Meigen's have light vertical setae, are the light form of the *L. furcata* with a yellow thorax, which has a narrow back fascia, and a wide central fascia on the abdomen, the back of the head is not darkened at the top. The 5th specimen, one male, is a larger species with protruding hypopygium, black vertical setae and only anterior central fascia of the thorax. Strobl determined this species as *L. flavicauda* Meig., however, is not applicable to Meigen's type of the latter type. So I have listed them as n. sp. (*L. fallax*). Even with the males, the abdomen is mostly dark, so that Panzer's illustration cannot relate to the same.

L. flavicauda male. It is that form of *L. lutea* which has a yellow thorax, only with a narrow central fascia, and a yellow abdomen only on the last segment.

L. lacustris. The 2 males are dark forms of *L. lutea*, with 3 broad thoracic ligaments. The 2 females have light-coloured vertical setae, they are forms of *L. furcata*, one of which has a still slightly darkened thoracic back, with a central fascia which does not reach the dorsocentral setae, but on the whole it is somewhat darker than the female under *L. lutea*, and the abdomen also shows one wider blackout, the sides and the ventra are yellow. The 2nd female is a somewhat darker form of the same species; the abdomen is very dark above, except at the extreme point, and the abdomen is partly so. The back of the thorax is quite dark with the exception of narrow fascia across the rows of dorsocentral setae.

L. riparia male is the form *L. trilineata* of *L. lutea*, with 3 broad thoracic fascia and dark abdomen above; *L. riparia* female is a dark *L. furcata*, with yellow fascia across the dorsocentral setae.

L. nigrimana female is a form of *L. lutea*. The central fascia is clear, rather narrow, the side stripe are hardly developed. The end of the anal vein is somewhat beyond the fork point of the 4th longitudinal vein.

L. thoracica. One female is indistinguishable from the type of *L. flavicauda*, it is again the form with only one, here fairly wide fascia, on the back of the thorax and above the dark abdomen; the second female is darker, of the yellow colour only dark fascia over the dorsocentral setae are left on the back of the thorax.

L. rivalis. The two males are again = *L. flavicauda* = *L. thoracica*; the side stripe are clearly visible on one of them.

The 3 female belong to different species, one is *L. lutea* with 3 thoracic fascia and a darkened abdomen, the other two are *L. furcata* with a rather darkened thoracic back.

L. tristis is the well-known large, dark species, which Boheman later described as *L. fuscipennis*.

L. palustris male is a dark form of *L. lutea*, with narrow yellow fascia across the dorsocentral setae and light sides of the chest. On the label there is also the statement: »von Fallén as *L. furcata*; the female belongs to the same form."

L. punctum males and females is again = *L. flavicauda* = *L. thoracica*. The side stripe of the thorax are as just indicated, the central fascia is narrow or fairly wide.

So to sum up the specimens in Meigen's collection are:

L. lutea Panz. male = *L. fallax* n. sp.

female pp. = *L. furcata forma typica*; p.p. *L. lutea forma typica*.
L. flavicauda = *L. lutea var. flavicauda*.
L. lacustris male = *L. lutea var. trilineata*.
female p.p. = *L. furcata var. rivalis*, p.p. = *L. furcata var. lacustris*.
L. riparia male = *L. lutea var. trilineata*.
female = *L. furcata var. lacustris*.
L. nigrimana female = *L. lutea var. trilineata*.
L. thoracica female p.p. = *L. lutea var. flavicauda*, p.p. = *L. lutea var. palustris*.
L. rivalis male p.p. = *L. lutea var. flavicauda*; p.p. = *L. lutea var. trilineata*.
female p.p. = *L. lutea var. trilineata*; p.p. = *L. furcata var. rivalis*.
L. tristis Meig. = *L. tristis*.
L. palustris male and female = *L. lutea var. palustris*.
L. punctum male and female = *L. lutea var. flavicauda*.

Macquart¹⁴ did not describe any new species. The specimens he determined in the Paris Museum are difficult to recognise due to the dirt. Apparently he also found it difficult to find his way around Meigen's species. His male and female *L. lutea* are lighter forms of *L. lutea*; male and female *L. riparia* are dark *L. lutea*; he identified specimens of *L. furcata* with a pale thorax and largely darkened abdomen as *L. flavicauda*.

As far as Zetterstedt's new species are concerned, his *L. trilineata* = *L. lacustris* Meig. male = *L. lutea* Meig. var. *trilineata*; however, the female is a dark *L. furcata* with a broad central fascia and a darkened thorax in front.

L. cinerella is a very dark *L. furcata*, while *L. impicta* is undoubtedly the light form of *L. furcata*, which was considered new by Zetterstedt, particularly because of the fact that it was not described by any researcher before him and was characterised by the remarkably small hypopygium.

Incidentally, as far as Zetterstedt's conception of species is concerned, according to specimens from Lund's collection that he himself determined:

L. lutea = *L. lutea forma typica* and var. *flavicauda*.

The statement that the 1st antenna segment should be yellow, however, suggests that Zetterstedt also recognised *L. fallax* n. sp. but assigned the designated species here.

L. thoracica = *L. lutea var. flavicauda*.

L. nigrimana is a very dark form of *L. lutea*, only the humeral lobe are still yellow in the specimen I examined; the anal vein flows under the left wing, in the right a little behind the fork point of the 4th longitudinal vein.

L. riparia = *L. furcata var. lacustris*.

I saw no specimens of *L. palustris*; it is probably again a rather dark form of *L. lutea*, with the humeral lobe still yellowish, because Zetterstedt also knew the male and it is said to have a hypopygium of the large variety.

I received valuable information about the two Gimmerthal species from State Councilor Sintenis. Because the diagnoses are quite difficult to access, I would like to repeat them here:

¹⁴ Macquart. Histoire naturelle des Insectes, Diptres II. (1835), Tijdschr. v. Entom. XLIX.

Lonchoptera cingulata. Thorace ferrugineo, vitta fusca; abdomine fusco, incisuris albis; ventre luteo; pedibus luteis, tibiis anticis apice et tarsis fuscis. Long. male 1 Lin.

"In Curland, viewed by H. Pastor Kawall."

L. grisea. Thorace grisea, vitta fusca, abdomine nigro, pedibus luteis, tarsis nigris. A female. Lower face and forehead dark brown, parting with grey points, epistomal margin yellow, antennae black. Thorax in a certain direction of light slate grey, on top with dark brown fascia. Abdomen black. Legs light red-yellow, feet of the front and rear legs black. 1 Lin.

Mr. Sintenis was kind enough to inform me that he is currently investigating Gimmerthal's types and that *L. grisea* = *L. tristis* Meig. There is no type of *L. cingulata*, it is probably the male of *L. thoracica* Meig. = *L. flavicauda* Meig., Which also seems very plausible to me.

Even according to Schiner's *Fauna Austriaca*, the species cannot be distinguished with certainty. According to Strobl's reports, *L. lutea*, *L. lacustris* and *L. trilineata* in Schiner's collection agree with his opinion; it would therefore be *L. lutea* = *L. furcata*, *L. lacustris* = the very dark form of *L. lutea*; *L. trilineata* = the three-striped form of the same species. Perhaps Schiner also mixed the two species *L. furcata* and *L. lutea* with one another. For *L. lutea* he at least quotes the information about the males, but does not speak of the completely inconspicuous hypopygium, while the information for *L. lacustris*: "Forehead whitish-yellow, white-dusted" and the small size almost indicates the dark form of *L. furcata*.

L. punctum seems to be a lighter *L. furcata* with a dark abdomen, *L. favicuuda* with a slightly lighter abdomen. The latter is said to be the smallest of all.

L. tristis, on the other hand, is given as the largest; it corresponds to Meigen's style of the same name. Strangely enough, according to Schiner in Austria, this species is the smallest of all.

L. nitidifrons Strobl is based on only one male. I have not seen any specimens that are similar in every way, but I suspect that it is a particularly bright and perhaps not yet completely coloured specimen of *L. lutea*.

L. scutellata Stein and *L. pictipennis* Bezzi are no doubt good species.

Determination table [Key to species of Lonchoptera]

1. Vertical setae all light; anal vein almost always ends far beyond fork of 4th longitudinal vein 2
- Almost always at least middle pair of setae black 3
2. Scutellum very dark *L. scutellata* Stein
- Scutellum partly yellow, forehead dusty whitish¹⁵ *L. furcata* Fall.
3. Wings with apical black spots or at least darkened around 2nd to 4th longitudinal veins
..... *L. pictipennis* Bezzi
- Wing plain 4

¹⁵ If the forehead is shiny yellow, then there is probably a variety of *L. lutea* Panzer. for which species exceptionally all vertical setae are yellow.

4. Upper postocular setae black; thorax yellow, central stripe presutural only¹⁶.....
 *L. fallax* n.sp.
- All postocular setae yellow 5
5. Males 6
- Females 7
6. Lower middle leg with a ridge of spines; yellow-brown body; forehead mostly
 dusted, not very shiny *L. strobli* [n.sp.]
- Middle leg only about 3 setae in the middle; black-brown body; forehead glistening
 black-brown. *L. tristis* Meig.
- Lower middle leg without setae; colour very variable; forehead mostly yellow, rather
 shiny..... *L. lutea* Panz.
7. Upper fore leg with only 1 seta before apex; black-brown body; forehead glistening
 black-brown..... *L. tristis* Meig.
- Upper fore leg with several setae before apex 8
8. Fore tibia with inner seta; yellow-brown body; forehead mostly dusted, not very
 shiny
 *L. strobli* n.sp.
- Fore tibia without inner seta; forehead mostly yellow, not very shiny ... *L. lutea* Panz.

1. *L. lutea* Panz.

1809. *Lonchoptera lutea* Panzer. Fauna german. CVIII. 20 & 21.

1823. *Dipsa furcata* p.p. Fallén. Dipt. Suec. Phytom. p.1.

1824. *L. lutea* p.p. Meigen. Syst. Beschreib. IV. p. 107.

- » » *flavicauda* » » » » » »
- » » *lacustris* p.p. » » » » » »
- » » *riparia* ♂ » » » » » 108
- » » *rivalis* ♂ ♀ p.p.» » » » » »
- » » *nigrimana* ♀ » » » » » »
- » » *thoracica* ♀ » » » » » 109
- » » *palustris* ♂ » » » » » »
- » » *punctum* ♂ » » » » » 110

1846.» *cingulata* Gimerruat.Corr. bl. Nat. Ver. Rigal. p. 103

1847.» » » Bull. Soc. Imp. Moscou XX. p. 182

1848.» *lutea* p.p. Zetterstedt. Dipt.Scand. VII. p. 2802.

- » » *thoracica* » » » » » 2803.
- » » *trilineata* p.p. » » » » » 2804.

¹⁶ If the notum is completely grey, then compare what was said below about a dark notum from *L. furcata*.

- » » *nigrimana* p.p. » » » 2809.
- 1862.» *lutea* p.p.? Schiner Fauna austr. I. p. 248.
- » » *lacustris* p.p.? » » » 244
- » » *trilineata* » » » »
1890. » » Stein. Wien. Entom. Zeitg. IX. p. 110.
1893. » *lacustris* Strobl .Mittheil.Verein Steierm.1892 p.157.
1893. » *trilineata* Strobl. Mittheil. Verein Steierm. 1892. p. 157.
1900. » » » Tief's Nachlass. Jahrb. Landesm. Kärnten. XLVII. p. 194.
1898. *L. nitidifrons* Strobl. Mittheil. Verein Steiermark. 1897. p. 221
1900. *L. nigrimana* » Tief's Nachlass. Jahrb. Landesm. Kärnten. p. 193.

This species is very variable in colour, which, together with the fact that Meigen has described some almost similar specimens as a different species, explains the rich synonymy. The colour changes between almost completely yellow and almost completely grey. As the brightest specimen I would like to consider one captured by Strobl, which he described and named *L. nitidifrons* n. sp. I will come back to this below.

Forehead shiny yellow, only slightly whitish frosted at the edges of the eyes. At most the immediate surroundings of the ocellar triangle are darkened, with lighter specimens only the latter [?]. The back of the head is more swollen than in *L. furcata*, in the lightest specimens completely yellow, in the darker specimens darkened in the upper half. Lower face whitish. Antennae completely black. In the vast majority of cases, at least the inner vertical setae are black. One of these is seldom yellow; e.g. Meigen's male type of *L. riparia* and some of the specimens I captured. In August 1905 I captured a male in Loosdrecht (Prov. Utrecht) in which all the vertical setae are yellow, it belongs to var. *flavicauda*.

Postocular setae entirely yellow. There are almost always 5 black epistomal setae on each side, the last one a little behind the rear corner of the eye. The lightest parts the thorax are completely shiny yellow, almost without a central fascia, only present in front of the humeral lobe in the male and then weak; more complete in females, but narrow, expanded in front of the humeral lobe and extending over it.

Much more common are those specimens in which at least the central fascia is completely present; anteriorly it is much narrower than the distance between the two rows of dorsocentral setae, clearly forked in front, the fork-prongs run in front of the postpronotal lobes, the fascia is broadest in front and behind and reaches the scutellum. On many specimens there is a hint of lateral fascia. If these become very clear, then one obtains the var. *trilineata* in which, the central fascia has mostly widened and then almost occupies the space between the dorsocentral setae. Since the latter are still located on clear yellow fascia, these fascia are significantly narrower in even darker individuals and ultimately no longer exist at all, so that the entire back of the thorax then appears dark.

The scutellum is completely yellow in the clear areas, in others it is yellow with a longitudinal fascia continuing from the central fascia of the thorax, in the darkest areas it is almost completely darkened, only yellow at the edge. The back is sometimes yellow, too, but mostly darkened.

The sides of the thorax are still yellow in many specimens, even if the notum is already quite distinctly grey. In the darkest individuals, these also become partly or almost entirely grey.

The colour of the abdomen is just as variable. It is only now and then mostly yellow; in my lightest specimens only the basal third is [grey], in females it is sometimes not even completely black. Most of the time, the darkening extends further back, so that the abdomen is almost completely dark even with the var. *trilineata*.

The penultimate ring of the male abdomen is significantly longer than the previous one, and almost as wide as the last. This is only completely yellow in the lightest parts, mostly it is darkened at least in the middle, or dark with a yellow edge. The hypopygium (Fig. 5, 6) is darkened, mostly grey-brown with yellow lamellae, more or less only in very light specimens. Large, very protruding. The lamellae are somewhat shorter than wide, with strong setae at the edge, under which, closer to the ventral side, there are some setae that are characteristic of this species and are hooked at the end.

On the underside at the base there is a two-horned, skin-like, hairy platelet, next to it on each side an elongated hump with one short and one long seta.

The posterior gonapophyses are rod-shaped, with a curved tip and a short appendage in the middle of the outside. The anterior gonapophyses are short-haired at the end, on the inside with a row of setae, under which a stronger, S-shaped curved one folds out. The structure of the penis is quite developed.

The wings are monochrome, only very slightly tanned. The end of the anal vein is usually below the fork point of the 4th longitudinal vein, sometimes, as in the case of some males of the var. *trilineata* in the collection of the Hungarian National Museum, quite far in front of it, but with several mostly darker female specimens it is clearly, sometimes far, behind this point.

The legs are yellow, in the male lighter than in the female, even in the lightest parts there sometimes blackish or black areas on the anterior tibiae, with the exception of the base, and anterior tarsi; posterior tarsi are darkened at the tip. In the male, too, the front tarsi are generally obscured [?], and the other tarsi are somewhat darkened at the apex. On the upper edge of the fore legs there are 3 setae behind each other at the apex. Front and middle tibiae with 2 front setae in both sexes, the middle tibiae also have a small rear seta. Lower middle leg without setae.

While the colour in this series of *L. lutea* and *L. furcata* generally agree, there is a difference in that in *L. furcata* the darkening first appears in the front of the thorax and spreads backwards; in *L. lutea* there are initially lateral fascia, and very dark specimens are obtained by widening the 3 thoracic fascia. The forms with a yellow thorax, which only has a central fascia, and those in which only narrow fascia at most are left over the dorsocentral setae, coincide best and are probably often confused or misinterpreted by some authors. In both species one finds different coloured specimens at the same time in one and the same place, so the different forms are neither local nor temporal varieties. Most of the time, however, one particular form predominates.

According to Strobl, the long anal vein is particularly decisive for *L. nigrimana*, otherwise, according to him, it looks very similar to *L. tilineata* and *L. lacustris*. Because Strobl divides Lonchoptera into 2 groups according to the length of the anal vein, it is no wonder that he attaches great importance to this characteristic. As can be seen from my investigations, however, the length of the anal vein is variable in many species, and I myself have caught dark specimens of *L. lutea* in the same place, which differed from one another only in the relative length of the anal vein. Strobl also found only a single female from his *L. nigrimana*; it is true, also in the leg setae, entirely with *L. lutea*. The Meigen's type of *L. nigrimana* is a somewhat lighter form in that the side fascia of the thorax are not very noticeable; the anal vein only slightly exceeds the fork of the 4th longitudinal vein.

The dark colour of the anterior tibiae and tarsi, to which Zetterstedt¹⁷ attaches great importance, forms no specific characteristic at all; it is usually found in the darker forms of both *L. lutea* and *L. furcata*.

I have little doubt that *L. nitidifrons* Strobl is only one form belonging to this species. The only male on which this species is based is of a very light colour, and considering the collapsed legs, perhaps teneral. The forehead is shiny yellow, even the ocellar triangle hardly darkened, on the antennae only the third segment is somewhat darker; the abdomen is only completely darkened at the base, the extruding hypopygium is also completely yellow. The vertical setae are all black, the postocular setae, if present, including some of the upper ones, are all brightly coloured. I observe 3 epistomal setae on one side, 4 black ones on the other, the last one in the middle of the lower edge of the eye. As Strobl notes, the anal vein ends well before the bifurcation of the fourth longitudinal vein; an equally short anal vein is found elsewhere in *L. lutea*. The legs are almost entirely yellow, only the terminal segments of the tarsi are dark. Unfortunately, some of the leg setae have been lost. Enough of the setae still present, can be seen however, that the chaetotaxy of the front and middle tibiae corresponds to that of male *L. lutea*, in that both have 2 setae at the front. I don't see a seta down in the middle of the middle legs.

Apart from the overall lighter colour, which is not very important given the great variability of this species, the main difference from my brightest specimens is the smaller number of black setae on the epistomal margin. Given the otherwise general agreement, I would like to consider this feature alone as not belonging to a particular species.

The following, but not sharply separated, main forms can be distinguished in this species:

1. *var. nitidifrons* Strobl. Quite yellow, also the ocellar triangle hardly darkened; antennae mostly yellow, the 3rd segment darker below. The abdomen is black basally, the hypopygium is completely yellow.

Synonym: *L. nitidifrons* Strobl.

2. *forma typica*. As for the previous, but antennae completely black and about the basal third of the abdomen black; the thorax usually with a narrow central fascia.

Synonym: *L. lutea* Meig. p.p. female.

» » males and females according to Zetterstedt's opinion, p.p.

3. *var. flavicauda* Meig. Thorax yellow with only one fascia. Upper abdomen almost completely blackish.

Synonym: *L. flavicauda* Meig.

» *L. thoracica* Meig. p.p., Zett.

» *L. rivalis* Meig. p.p.

» *L. punctum* Meig.

» *L. lutea* according to Zetterstedt, p.p.

4. *var. trilineata* Zett. Thorax yellow with 3 fascias, otherwise like the previous form.

Synonym: *L. lacustris* Meig. male.

» *L. rivalis* Meig. males, females, both p.p.

» *L. riparia* Meig. mm.

¹⁷ Zetterstedt. Diptera Scandinavia. XIV, p. 6463.

» *L. nigrimana* Meig.

» *L. trilineata* Zett.

5. var. *palustris*. The interstices between the fascia are very narrow and apparent. Thoracic pleurites still mostly yellow.

Synonym: *L. palustris* Meig.

» *L. thoracica* Meig. females p.p.

» *L. nigrimana* to Strobl.

6. var. nov. *cinerea* de Meij. Notum and thoracic pleurites, as well as the abdomen completely darkened.

Synonym: *L. nigrimana* Meig., according to Zett.

» *L. lacustris* Meig., according to Strobl.

I designate the 4th colour variety as *L. trilineata* Zett., because his diagnosis corresponds very well to it, which is not the case for *L. lacustris* Meig. and *L. riparia* Meig., although Meigen's specimens partly belong to this variety. Nor can the darkest variety be recognized in any description. Zetterstedt's specimen of *L. nigrimana* Meig. belongs here, but the description mentions reddish yellow pleurites. Moreover, *L. nigrimana* is Meig. according to the type, a lighter variety.

While in the Netherlands the varieties 2-4 are more commonly found, an examination of the Italian material in the Bezzi collection showed that there the lighter forms seem to be more prevalent. The collection contained numerous specimens of the var. *trilineata*, also some of var. *palustris* and var. *cinerea*, but no lighter specimens. According to Bezzi, *L. trilineata* is the most common species in Italy, at least in the Marche and Abruzzo, he found it up to an altitude of 1800 m.

2. *L. furcata* Fall.

1823. *Dipsa furcata* Fallén. Dipt. Suec. Phytom. p. 1.

1809. *Lonchoptera lutea* female? p.p. Panzer. Fauna german. CVIII. 21.

1824. » » Meigen. System. Beschreib. IV. p. 107.

1824. » *lacustris* female » » » » p. 107.

1824. » *riparia* » » » » p. 108.

1824. » *rivalis* » » » » p. 108.

1848. » *riparia* Zetterstedt. Dipt. Scand. VII. p. 2807.

1860. » » » » XIV. » 6465.

» » *trilineata* » p.p. » » VII. » 2804.

» » *impicta* male female » » VII. » 2806.

1838. » *cinerella* Zetterstedt. Insect. Lapp. 792.

1848. » » » Dipt. Scand. VII. p. 2808.

1862. » *lutea* Schiner Fauna Austr. I. p. 243.

» » *punctum?* » » » » 244.

» » *flavicauda?* » » » » »

1890. » *lutea* Stein. Wien. Entom. Zeitg. IX p. 110.

1893. » » Strobl. Mitth. Ver. Steierm. 1892 p.156.
 » » *punctum* » » » » » » 157.
 » » *tristis* » » » » » » 157.
1899. » » » » Wien. Entom. Zeitg. XVIII. p. 144.
1896. *Lonchoptera trilineata* var. *pseudotrilineata* Strobl. Verhandl, Mitth, Siebenb, Verein Hermannstadt, XLVI. p. 43.
1899. *Lonchoptera trilineata* var. *pseudotrilineata* Strobl. Wien, Entom. Zeitg. XVIII. p.144.

This species is very variable in body colour; one finds completely yellow and on the other hand almost entirely grey specimens, with numerous transitions in between. Several levels of colour have been described as particular species.

The forehead is yellow, dusted with whitish, almost dull, only the ocellar triangle or, in the case of darker specimens the immediate surroundings, are dark, the lower face is whitish; the back of the head in the lightest specimens either completely yellow or only narrowly black at the top, which is most noticeable on the sides. In the darker specimens, the upper back of the head is darkened.

The vertical setae are all yellow, of the postocellar marginal fringe some of the upper ones are almost always black in a certain direction. Antennae black, at the base (the 1st and occasionally also the 2nd segment) lighter, yellowish.

The 4 front epistomal setae on each side are black; the 4th is below or slightly in front of the posterior corner of the eye. As an exception, the 5th seta is also black.

The lightest parts of the thorax are almost entirely yellow, frosted with white, matt, with a very narrow dorsal fascia, especially in front, which by no means fills the space between the dorsocentral setae; reaching the scutellum distally. In some specimens (Amsterdam, Sept.) even this fascia is barely noticeable. The fascia is broad in front, but, contrary to the character state in *L. lutea*, not forked, the area between the cervix and the wing base is on the whole somewhat darkened. In the case of darker specimens the median fascia is relatively broader and the anterior part of the thorax is more evenly darkened.

In other parts the lateral parts of the thorax are also darkened, so that only a narrow, slightly widening fascia on each side over the dorsocentral setae of the light basic colour remains. These fascia do not reach the front of the thorax.

The sides of the thorax are completely yellow in the light specimens, more or less darkened in the darker ones. The darkest show an almost completely grey thorax, on which the black central fascia, although ill defined, can still be observed when viewed from behind. Only the upper front edge of the mesopleuron then usually remains yellow.

The scutellum is mostly yellow, with a black mid-line, only occasionally almost completely dark on top.

The metanotum mostly blackish, only yellowish in a few light specimens (Bussum, in September).

The abdomen is mostly yellow in the lightest parts, with a narrow black central fascia, which sometimes appears broken off before the tergite margin; the last tergite is all yellow. Often the central fascia, especially at the base, is relatively wider.

Most of the specimens, even those in which the yellow colour still predominates on the thorax, usually show an abdomen that is almost completely black dorsally; only the narrow side edges of the apical segments and the last tergite are then still light in colour dorsally. The belly is sometimes yellow, hardly darkened, sometimes grey, so that

ultimately only the outermost tip of the abdomen is hardly any lighter in colour. (Hilversum, in Sept.).

The penultimate ring of the male abdomen is only slightly elongated, the last ring is very long.

The wings are monochrome, very little tanned, the anal vein is long, its end is consistently far behind the fork of the 4th longitudinal vein, sometimes just a little behind this point, as in a female from Pavia in Bezzi's collection. The legs are yellow, on the forelegs the tarsi (the metatarsus only a little) are posteriorly darkened, black-brown, the last 1 or 2 tarsi members.

The fore legs show 3 short dorsal setae one behind the other near the apex. The tibial setae are very short. In the case of the female, the front tibiae have 2 setae at the front and rear, roughly 1 in the middle, on the central tibiae there are 2 front, 1 rear (in the basal half) and 1 inner (in the apical half). The setae of the tibiae are slightly longer in this species than in the other species.

The above description initially refers to the female. The males are extremely rare, as mentioned above. Unfortunately, my only male, which undoubtedly belongs to this species (Winterswijk, in July), is missing its head. The specimen has a largely yellow thorax, with a narrow, black central fascia; the abdomen is largely black-brown, narrowly yellow at the apex and sides, the last segment is twice as long as the penultimate, yellow, darkened in the middle, which darkening is seldom sharply delimited. The hypopygium (Fig. 7, 8) is hidden under the last tergites, completely yellow. The lamellae are significantly longer than they are wide, with setae on the edge and along the central incision. On the underside of the basal segments one observes two short lobules in front of a semicircle of setae, which are probably to be understood as anterior gonapophyses. The posterior gonapophyses are very large, lobe-shaped. In the setation of the legs, it corresponds to the female, only a hair-shaped setae can be found at the base of the middle femur, a little behind the middle. On the other hand, I miss the setae on the front tibiae, but they have probably been lost, because the males of *L. impicta* Zett., which I consider after what has already been discussed on p. 50 to be identical to the present species, and which otherwise corresponds to the above specimen in the leg setae, shows there 2 setae on the outside. I can't find any more here either.

As I said, I am looking at *L. impicta* Zett. as a synonym. Dr. Bengtsson of Lund had the kindness to inform me that both the males and the females have only light-coloured vertical setae. Later I was able to examine the males myself. These have 4 black epistomal setae on each side, the head and leg setae are black except for the vertical setae. The thorax is yellow, only slightly darkened in front and on the sides; not much of a central fascia is visible, because of the thick pin. The scutellum is dark with a broad yellow edge, the metanotum is black-brown, the abdomen is largely dark, with a little yellowish-brown in the median line. The lateral edges of the tergites are so bent over the hypopygium that nothing of the structure can be seen.

On the whole, the specimen agrees almost entirely with my only male of *L. furcata*, only the anal vein is somewhat shorter, in that it opens into the wing edge in the only remaining wing of *L. impicta* immediately before the fork of the 4th longitudinal vein, while the same in my male takes place in the right wing base, in the left somewhat behind this point. The base of this fork is quite long in Zetterstedt's example, only slightly shorter than the lower prong of the fork.

According to Bengtsson's females from *L. impicta*, the end of the anal vein is far behind the fork of the 4th longitudinal vein.

One of Strobl's specimens labelled only "*L. tristis* male", certainly a very dark male, is particularly characterised by the fact that all epistomal setae and all postocular setae are almost black. Nevertheless it otherwise agrees so closely with the darkest form of *L. furcata* that I regard it as an extraordinarily darkened specimen. The following description applies to this specimen: head dark brown, forehead dull, dusty grey; lower face light brown, genae brownish yellow, antennae black. All vertical setae, postocular setae and epistomal setae (7 on each side) black, the postocular setae shimmering light only in a certain direction.

Thorax dark brown, almost dull, with thin white-grey pollination; pleurites a little more shiny; scutellum yellow only on the margin. Abdomen dark brown, somewhat shiny; the penultimate segment a little longer, the last segment considerably longer.

Wings brownish; the anal vein ending far beyond the fork of the 4th longitudinal vein. Legs yellowish brown, tarsi darkened at the apex. Rear tibiae not thickened. Fore legs on upper edge with 3 setae behind each other; I noticed a seta on the outside of the front tibiae, roughly in the middle. Middle tibiae with 2 outer setae, also with one seta each at the back (at the apical third of the base) and inside (at the end of the 2nd third). In addition to the seta near the apex, I can see some hairs on the middle tibiae. The hair-like seta in the middle, as well as the 2nd seta of the front tibiae, may have been lost, which can be very easily the case.

The hypopygium (Fig. 9) is small, hidden and, as far as it can be seen with the magnifying glass, corresponds in general shape to that of my *L. furcata* male. It is all dark in colour. Body lengths almost 3 mm; wing length 3 mm. This male was donated by Mr. Pr. Gabr. Strobl captured on August 1st on the banks of the Ems in the Gesäuse near Admont.

According to the colouring, four main forms can be distinguished in this species, which, however, are not sharply separated from one another and therefore cannot claim the value of particular species.

1. *forma typica*. Back of the head completely yellow. Thorax yellow, at most with a narrow central fascia; The abdomen is the same: the median fascia is mostly narrow, often broken off at the segmental margins.

Synonym: *L. lutea* Mg. female

L. impicta Zett. male, female.

L. lutea according to Strobl's view.

2. var. *rivalis* Meig. Back of the head p.p. darkened; middle fascia of thorax somewhat wider, abdomen almost completely dark above.

Synonym: *L. rivalis* Meig. female, *lacustris* Meig. female p.p.

L. trilineata Zett. female p.p.

L. punctum according to Strobl.

3. var. *lacustris* Zett. Like the previous one, but the thorax much darker, so that only narrow yellow stripes are left over the rows of the dorsocentral setae.

Synonym: *L. lacustris* Meig. female p.p.

L. riparia Meig. female, Zett. p-p.

L. tristis var. *pseudotrilineata* Strobl.

4. var. *cinerella* Zett. Fascia almost completely absent, including the thoracic pleurites, grey.

Synonym: *L. cinerella* Zett.

L. tristis according to Strobl.

The species seems very common. Most of the Italian specimens belonged to the typical variety, but there are also some darker ones, including the var. *cinerella*. Strobl¹⁸ just mentions the darker forms (var. *rivalis*, *lacustris*, *cinerella*, under the names *L. punetum*, *L. tristis* var. *pseudotrilineata* and *tristis* respectively) from Spain.

3. *L. tristis* Meig.

1824. *L. tristis* Meigen. System. Beschreib. IV. p. 110.
1842. *L. grisea* Gimmerthal. Bull. Soc. Imp. Nat. Moscou. XV. p. 671.
1851. *L. fuscipennis* Boheman. Entomologiska Anteckningar under en Resa i Svödra Sverige 1851. Kgl. Vet. Ak. Handl. 1851. p. 207.
1855. *L. fuscipennis* Zetttersedt. Diptera Scandinaviae. XII. p. 4818.
1862. *L. tristis* Schiner. Fauna austr. p. 244.
1891. » » Sintenis. Sitzber. naturf. Gesellsch. Dorpat. IX. p. 476.
1899. *L. fuscipennis* Bezzi. Bull. Soc. Entom. Ital. XXX. p.161.

This species is constant in body colour, only dark specimens appearing. It is characterised by its dark colour and its size compared to most species.

Forehead very shiny, dark brown, only narrowly whitish pruinose adjacent to the eyes, lower face only slightly lighter, also shiny. Antennae completely black-brown. Inner vertical setae black, the rest and all postocular setae yellow. All epistomal setae black, the rearmost, 6th, located directly behind the gena.

Notum dark brown, with little whitish pruinosity, so quite shiny. Scutellum similarly coloured, with a narrow yellow border. Metanotum darkish. Pleurites almost entirely grey-brown, more or less yellow at the sutures and in front. In any case, Meigen's statement "yellow pleurites" is not applicable.

Abdomen blackish, apex of the last segment with large yellow spots, also the lateral edges, at least the last segments, narrow yellow. Sternites yellow to dark brown. The penultimate segment is only slightly shorter than the previous one, the last segment is very elongated. Hypopygium (Fig. 10, 11) large, black-brown, with short yellow lamellae, the inner corner of which protrude somewhat. They have only a few setae on top at the edge and along the central incision. On the underside there are 5 curved setae close to each other at the base and 1 shorter setae on each side in front of these, otherwise the underside is almost only briefly setose. The posterior gonapophyses with a lateral leaf-like appendage, somewhat pointed at the apex; the front ones are short and each have a thick, curved seta with a sharp tip in the end part.

Wings monochrome, greyish. The end of the anal vein is not always in the same place, mostly under the fork of the 4th longitudinal vein, sometimes a little in front of it in the male, sometimes under, sometimes a little or even quite far behind it in the female.

¹⁸ Strobl. Spanische Dipteren. *Wien. Entom. Zeitg.* XVIII. 1899. p. 144

Legs mostly darkened, trochanters and femora brightest. The rear tibiae clearly thickened towards the tip in both sexes. On the upper edge of the fore legs there is only a seta immediately at the apex; but at a somewhat greater distance from the tip there is a setae on the front of the tibia.

The front tibiae show 1 seta at the front, the middle tibiae 2 in front and a very short one at the back; the females have 2 front and 1 very short rear seta on the front tibiae, and the same on the middle tibiae, which therefore correspond to those of the male.

The middle tibiae of the male (Fig. 12) have at the middle of the underside two or three setae, of which only the last is longer and also the seta which occurs at the tip of *L. strobli* protrudes significantly at the tip.

So far only one specimen of this species has been found in the Netherlands, at Winterswijk, Prov. Gelderland. It is also found in England, Belgium, Germany, Austria, Scandinavia and Italy. According to Mr P. Stein's letter, he found it very often in Kissingen, while he has not collected it in the Genthin area.

4. *L. scutellata* Stein

1890. P. Stein. Zwei neue Dipteren. Wiener Entom. Zeit. IX. p. 109.

Only the typical Stein's specimens is known of this species; both specimens are of the same, light colour.

The whole body is dirty pale yellow, especially the head, trunk, antennae and legs. Forehead a little shiny, only the small, round ocellar triangle black. The 2 front orbital setae are very close together. The vertical and postocellar setae are all yellow, otherwise the setae of this species are lighter than usual, so that the forehead setae only appear dark in a certain direction, but usually have a yellowish shimmer. The same is the case with the epistomal setae, at least in the male. There are 4 somewhat darker setae each side, the 4th is under the posterior corner of the eye. With the female, the 5th also appears quite dark on one side. Even the setae on the thorax and on the legs show a light shimmer in a certain direction.

In the middle of the thorax there is a thin brown fascia, gradually widening posteriorly, which continues on the scutellum so that it is completely deep black with some sheen; on the abdomen a rather broad, not sharply demarcated, dark brown fascia. Metanotum black, only yellow on the sides. In the male, all abdominal segments have narrow, dark posterior margins.

The hypopygium of the male is conspicuously small, and in the present specimen it is mostly hidden under the broadly folded margins of the last abdominal segments. I have therefore not been able to observe precisely its shape or that of the lamellae. The yellow setae on the edge of the latter are just visible. The penultimate segment of the abdomen is only slightly longer than the previous one, the last ring 1.5 times as long as the penultimate one.

The wings are monochrome, somewhat browned with yellow veins, the end of the anal vein lies far behind the fork of the 4th long vein.

The legs are also all yellow.

At the end of the fore leg there are 2 setae on top, 2 on the front and 2 on the back. The front and middle tibiae show 2 setae at the front and 1 in the back in both sexes; the latter is the same length on the front tibiae as the front setae, and slightly shorter on the middle tibiae.

The front and middle femora also have a hair-like seta ventrally near the base of the female; this is hardly developed on the rear femora.

Body lengths 2.5-2.75 mm.

The couple was captured by Stein in April '87 through stripes [?] in the forest in Saxony.

This species cannot be mistaken for the black scutellum, and it can also be distinguished immediately from the lightest specimens of *L. furcata* to which it otherwise looks very similar, and with which species it has the inconspicuous hypopygium in common.

According to this characteristic, Stein compares the species with *L. impicta* Zett especially, in that this is the only one that agrees with it. The male of *L. furcata* (Stein's *L. lutea*) also remained unknown to him.

5. *L. pictipennis* Bezzi.

1899. Bezzi. Contribuzioni alla fauna ditterologica italiana II, in: Bull. d. Soc. Entom. Ital. XXX. p. 161.

This very recognizable species was described in great detail by Bezzi.

Head black, forehead the same, with white dusting, the ocellar triangle a dark spot. Back of the head mostly grey, not even the entire lower half yellowish, lower face and cheeks yellowish white. Black antennae. Inner vertical setae black; postocellar setae all yellow. There are 5 black epistomal setae on each side, the last one standing far back on the gena.

Thorax black, dusted with grey, only the postpronotal lobes and mesopleurites sometimes yellow; the scutellum sometimes with a yellow tip.

Abdomen completely black, with greyish pollination.

The penultimate segment of the male is somewhat longer than the preceding ones, the last segment almost as long as the two preceding ones taken together, at the end with a yellow spot or only narrowly yellow margin. (Figures 13, 14).

Hypopygium large, excellent [?], black as long as the last segment, a little longer than wide, almost everywhere of the same width, the lamellae wide and short, their length is barely 1/3 of that of the base, their outer edge rounded, even in somewhat preferred to the middle. Except for the rear edge, there are only a few short setae in the middle. The turned-down edge shows some strong setae on the inside. On the underside of the anal segment, at the base, there is a cusp that ends in 4 curved spikes. The posterior gonapophyses are simple in shape, with a curved tip.

The front ones are short, with a long bristle at the end with a shorter one next to it.

The relatively long wings are distinguished by a large, dark spot on the tip, which is particularly well developed in the mm; the entire third of the latter is blackened; in the ff the darkening is sometimes greatly reduced and limited to a browning at the tip of the 2nd, 3rd and 4th longitudinal artery.

The end of the anal vein is roughly below the fork of the 4th longitudinal vein.

The legs are yellow.

On the upper edge of the fore legs there is no seta apart from the apical setae, probably one on either side that is to say front and back near the apex. There are 2 setae each on the front and middle tibiae; rear setae are absent. The middle tibiae of the males carry 2 small spines one behind the other near the base.

Body length 3.5-4 mm; Wing length 4-4.5 mm.

Italy, in Marche and Abruzzo, in mountain streams on stones, often in the company of *Clinocera* species (Bezzi leg.) [Empididae].

6. *Lonchoptera fallax* n.sp.

1824. *L. lutea* p.p. Meigen. System. Beschreib. IV p. 107.

1893. » *flavicauda* Strobl. Mitteil. Verein Steiermark. 1892. p. 158.

This species is very constant in body colour. The thorax is almost entirely yellow, darker specimens were not encountered.

Forehead yellow, shiny strongly, only a little whitish dusted; this pollination is most evident when viewed from behind. Almost only the ocellar triangle is dark stained. At the back of the head the upper half is mostly entirely blackish, sometimes only so at the top, with a bit of white dust, the lower half yellow. Lower face and genae whitish. Antennae black, the 1st segment yellow. The vertical setae all black, as are the upper postocellar setae, as far as the black colour of the back of the head extends. Only the 4 front epistomal setae on each side are almost always black, the 4th on each side is in front of or under the rear corner of the eye.

Thorax yellow, only very slightly shiny above, thinly white frosted. A blackish longitudinal fascia runs across the middle in front, which begins broadly at the neck and gradually narrows towards the rear; it does not exceed the anterior half of the thorax by a long way, but ends approximately next to the 2nd dorsocentral bristle. This fascia is forked in front and runs along the inside of the postpronotal lobes on each side. Sometimes it is not very clear. Marks quite yellow, like the back of the thorax. Pleurites a little more glossy. In the suture in front of the wing base there is a clearly elongated black mark.

The abdomen is almost completely dark, with a poor sheen and a whitish tinge. Ventrums yellow at the base, still mostly dark. Sometimes the yellow colour expands a little more upwards, to the sides of the abdomen. With males, the margins in the last segments are narrow yellow, including the last. Segments yellow only on the sides. From Pokorny's collection, I saw males in which the yellow on the sides of the abdomen had become larger. Rear segments sometimes even a little wider on each side than the black central fascia. The last segment almost the same length as the penultimate one at the males, both are significantly longer than the previous ones.

The hypopygium (Figs. 15, 16) blackish, with yellow margins; the latter are relatively large, much longer than wide, with strong dorsal and marginal setae, with a few setae below, otherwise short pilose. The outer corner protrudes so that there is a deep incision in the middle.

The posterior gonapophyses are strongly leaf-shaped before the apex, the end hook has a few very short spines below. The anterior gonapophyses are also long and narrow at the base with an outward-facing long seta, and at the forked end with 2 smaller ones. The penis scaffolding is relatively well developed. Above this, at the base of the anal segments, there is a short, two-horned, brown, hairless platelet.

Wings monochrome, somewhat brown tinged; the length of the anal vein is quite variable. The end of the anal vein in the male is more or less below the base of the fork formed by the 4th longitudinal vein, sometimes far beyond this point; in females it is sometimes only a little, as in the Meigen specimen, or sometimes quite noticeably beyond it.

The legs are yellow, the tarsi darkened at the end. The dark spots bases of the femora are very clear. Leading edge of the fore leg with 2 setae behind each other before the apex. There are 2 setae at the front and 1 at the rear on the front and middle tibiae. This species

is characterised by strong development of the latter, as it is not inferior to the relatively long front setae in length. In one case the upper front seta of the mid-tibia was doubled. Base of middle leg with hair-shaped setae.

In the Netherlands I only found this species in the forest at Baarn, Prov. Utrecht. I also saw Belgian and Austrian specimens. I didn't find any Italian specimens in Bezzi's collection.

7. *L. strobli* n.sp.

1896. *L. trilineata* var. *riparia* Strobl. Verh. Mitt. Siebenb. Verein Naturw. Hermannstadt. XLVI p. 43. — 1893. Mitteil. Verein Steierm. 1892 p. 157.

1900. *L. riparia* Svrost. Trer's dipterol. Nachlass aus Kärnten u. Oesterr.-Schlesien. Jahrb. d. naturh. Landesmuseum v. Kärnten. 26^{tes} Heft. XLVII Jahrg. p. 193. Klagenfurt.

Head brown-yellow, frons mostly brown up to about the fronto-orbital setae, and brown-yellow on the sides, but with a slight whitish dusting, so only slightly shiny. Lower face and genae whitish. Back of the head somewhat darkened in the upper half. Antennae completely black. Vertical setae all black.

Postocular setae all light in colour.

Usually 7 black epistomal stae, the last far behind the posterior corner of the eye, the penultimate a little beyond this point.

Thorax brown-yellow, darker above, in that there are three broad, somewhat darker, but hardly noticeable fascia. The middle one fills the space between the dorsocentral setae, the lateral ones are especially visible behind the transverse suture, hardly present in front of it. Pleurites brownish yellow, scutellum completely brownish yellow, or more darkened, only yellow at the edge. Metanotum black-brown. The upper part of the abdomen is black-brown with narrow whitish rear margins, the last segment on the rear margin is slightly wider yellow. In the males, this segment is much longer than the previous ones, and the previous one hardly elongated. Ventrums black-brown.

Hypopygium (Fig. 17, 18) large, clearly protruding, dark brown with small yellow lamellae, which are clearly wider than long and are somewhat edged at the tip. These have setae at the top edge and along the incision, and only briefly hairy at the bottom, but there are two curved setae at the base at the corners of a diamond-shaped, browned area. The part of the lamellae that is folded down shows some very thick but short setae on the edge. The posterior gonapophyses are rod-shaped, with a tooth-like protrusion in the centre outside. The anterior gonapophyses are very short, each end with 2 very strong setae.

Wings somewhat brownish. The anal vein in the male ends below the fork, in the female sometimes also below, sometimes in front of, in other cases clearly beyond the fork.

Halteres yellowish white.

Legs brown-yellow, also the tarsi not darker at the apex. Posterior tibiae only slightly thickened towards the tip, less than in *L. tristis*.

Fore leg [femur?] on upper edge with 3 setae behind each other; also with 1 seta on the front. Setation of the front and middle tibiae as in *L. tristis*, and in females on the front and middle tibiae 2 front and 1 weak rear setae; in males the front tibiae have only 1 front seta and no rear seta at all. The middle legs of the male (Fig. 19) are armed ventrally with about 6 short black spines; they are almost evenly distributed over the entire length; there is also a weak seta in before the apex.

Body length 3 mm; Wing length 3.5 mm.

There is little variability in colour in this species; only a few specimens are a little lighter than stated above. In the lightest females, the light colour is somewhat more spread out on the forehead, so that almost only the immediate vicinity of the ocellar triangle remains dark, the longitudinal fascia are then hardly indicated on the thorax and slightly delimited yellow spots are present on the abdomen on the sides of the 1st segment and in the middle the posterior margin; sometimes the entire apical half of the abdomen has a light longitudinal fascia along the median line.

The species differs most easily from the very similar *L. tristis* by the lighter body colour, by the differently coloured forehead, by the setation on the upper fore leg, and also by the armament of the middle femur. The females also look at times very similar to larger, darker examples of *L. lutea*, the latter species, however, only has 2 setae at the front on the front tibia, with *L. strobli* there is also a rear seta; Moreover, the females of *L. strobli* have red-brown or brown-yellow anterior tibiae and tarsi, while the same in the darker specimens of *L. lutea* are blackish. The males also differ in the shape of the terminalia.

This is the *Lonchoptera* which Strobl initially regarded as a mountain form of *L. trilineata*, with a dull, grey-dusted notum and poorly delimited fascia. He distinguished it as var. *riparia* by saying that it was identical to this Meigen's species.

Later he considered both species to be easily distinguishable, and also pointed out the different leg colour and the formation of the lamellae of the hypopygium. However, Meigen's *riparia* is really *L. lutea* var. *flavicauda*, so that the present species has to be renamed.

I only saw Austrian and Italian specimens of this type. In Bezzi's collection you can find it from the Carpathians (Azuga), Maiella, Acquasanta, Tenna, Serroni. In the last three places it was found at the same time as *L. tristis*.

In the collection of the Hungarian National Museum in Budapest, it can be found from the Velebit (Brusanje) and Capella Mountains (Mosunje), southern Hungary (Mehidie), Transylvania (Retyezatz, Svozata, Ruda); in Strobl's collection also from southern Styria; so this species is evidently a mountain species.

At the moment, I did not particularly consider non-European *Lonchoptera* due to the lack of material. I only want to inform you that in Osten Sacken's Catalog of the Described Diptera of North America, 2nd edit., 1878 only *L. lutea* Panz. and *L. riparia* Meig. are listed, with the indication that the specimens are not different from the European ones. In the latest catalog of Diptera from the same area compiled by Aldrich, *L. punctum* Meig is also mentioned, and in the appendix of the literature published in 1904 under the Diptera *Lonchoptera lacustris* Meig captured by Baker in California and Nevada is given. From the difficult exploration of the European species it is evident that very little has been established as to which of the forms I have cited above these American specimens are identical with. It cannot be ruled out that there is some endemic species among them. Special remarks of these species are not found in American literature, the only North American specimen which I was able to examine, a female from Canada, was the dark var. *cinerella* of *L. furcata*; only the postpronotal lobes were still yellowish below, the area of the dorsocentral setae here still very little yellow. It agrees entirely with the European specimens.

In van der Wulp's Catalog of the Diptera from South Asia, 1896, on p. 106 of lonchopterids only the *Cadrema lonchopteroides* Walk. [Chloropidae] is listed, which doubtlessly belongs here.

In my earlier published treatise on the larva of Lonchoptera¹⁹ I have identified reared specimens as *L. lutea*. My more recent investigations have shown that the larvae studied at that time, as well as almost all those later bred by me, also belong to *L. lutea* in the present sense. I received the following forms:

Diemen, Miirz '99, die var. *flavicauda*.

Bussum, April » » » »

Hilversum, » '02, » » *trilineata*.

» April 04, » » *cinerea*.

I found the pupae of the latter on endive leaves in mid-November 1903. In mid-January 1902 I collected smaller and almost mature larvae in the garden on dry leaves lying on the ground. In April a fly emerged from them.

Renewed investigations carried out on this material have led me to differing views on some points from those previously represented by me.

So first of all with regard to the importance of the long segment on the front body, which I previously, with some doubt, interpreted entirely as the metathorax. After a closer study of the muscles, the trachea, the lateral papillae of this section, I now believe with Lubbock that it represents a double segment. While according to him, however, it should be = meso- + metathorax, I understand it as metathorax + 1st abdominal segment. This double segment has on each side 2 lateral papillae, 2 lateral muscles, 2 tracheal branches running to the abdominal cord, while otherwise the segments have only one on each side (Figs. 20, 21). The double row of dorsal papillae already indicates a fusion of two segments. Then 7 abdominal segments can be seen from above, while the break-through points of the prothoracic horns are not found on the 1st abdominal segment, as in the eumyids and syrphids, but on the 2nd, i.e. on the same segment as the phorids. As a result of the above view, I now also believe that the segment of the *Callomyia* [Platypezidae] larva²⁰ distinguished by twice the number of marginal processes is to be regarded as the metathorax + 1st abdominal segment.

I have also come back from the view that the lateral papillae are to be understood as the end apparatus of the chordotonal organs. Such a scolopic organ ends up close next to it (Fig. 22), but a little more backwards and upwards, so that there is no direct connection. The nerve of the lateral papilla stems from the ganglion of another multiscolopic organ, which connects with the skin at a fairly great distance from the papilla at the very top of the soft lateral wall, that is, just below the back sclerite; just behind the attachment point there are 2 small crescent-shaped warts. These ganglia lie directly at the segment boundaries, closely approaching the abdominal wall, the end part of the chordotonal organ bends around the longitudinal muscle, which runs on the side of the body from segment boundary to segment boundary. Close behind it, the trachea that leads to the abdominal cord bends around the muscle in the same way.

As for the arrangement of the ventral papillae, there are six in a transverse row on each of the posterior segments in the middle of the body; there is a considerable space between the two middle ones, it is almost three times the diameter of the circle surrounding a papilla. A little more laterally there is first one that is positioned a little more forwards, then one which lies in the row of the medians. The middle field containing the latter 6 bears scattered blunt setae, which are not much denser around the papillae. Around the two sides, the setae are stored more densely and are pointed at the end. All of these papillae

¹⁹ De Meijere. Ueber die Larve von Lonchoptera, Zool. Jahrb. Abt. f. System. XIV. 2. 1900, p. 87.

²⁰ De Meijere. Ueber die Metamorphose von *Callomyia amoena* Meig. Tijdschr. voor Entomol. XLIII, p. 224.

are in the posterior half of the segments. The inner circle surrounding the papillae is extremely delicate, sometimes somewhat star-shaped, but these are by no means real hairs; these are always significantly larger on the ventral side.

The arrangement of the papillae on the mesothorax can be seen in fig. 20. Counted from the median line there are first a circular papilla on each side, then a group of 6 very small papillae, 4 of which have fine setae, then 2 circular, furthermore 2 jagged papillae, of which the upper one is probably to be considered the lateral papilla. In this segment, and also in the metathorax, the imaginal discs are somewhat more dorsal than the lateral papillae. The prothorax shows 4 ventral papillae at the same distance from each other; the middle ones are double papillae, all are without setae. Close below these paired papillae are two more numerous groups of papillae, some of which have spines. When the body is stretched out anteriorly, these papillae are roughly in the middle of the pharynx.

The sensory organs present on the setae-like extensions of the anterior segments and the 7th abdominal segment are probably to be regarded as modified dorsal papillae. Also at the very front of the body, still in front of the pharynx, a group of 2, and more laterally, one of 3 tiny papillae can be observed on each side.

In each of the 3 thoracic segments there are 2 trachea, connected by an anastomosis, running to the abdominal cord; they finally enter the abdominal cord ventrally, while the related branches of the abdominal segments are connected to the abdominal cord from the side, at least not from below.

The chitin thickness of the back sclerite is approx. 0.012 mm. thick,

The upper eighth segment is coloured brown, otherwise it is hyaline. The T-shaped crevice can be seen as a transparent line in the living larva. The buttons are rounded at the end of the adult larvae; there they are uncoloured and provided with a few fine dots.

As for the pharynx, Wilkinson²¹ in a treatise on the pharynx of the *Eristalis* larva, which is essentially similar to that of *Lonchoptera*, set out the mechanism of this complicated apparatus in detail. He remarks regarding my statement that according to him the food parts are held in the lower chamber is incorrect, it should be called the upper chamber.

When he adds: "de Meijere describes only a flattening out of the top of each of the pharyngeal ribs of the *Lonchoptera*-larva, and says that there is no fringe of barbules," I have to remark that I do not consider the absence of the latter completely denied. I perceived fine transverse grooves in the upper horizontal parts of the ribs in this larva; I left it undecided whether these were real grooves that led to Franzen [the fringes?], because I had not unequivocally observed this.

On September 12th, 1905, at Hilversum, I captured a *Lonchoptera* larva that had recently become puparium-like and which was evidently specifically different from the ones I had found earlier. Because *L. furcata* was common at this point, and since the puparium was smaller than that of *L. lutea*, and *L. furcata* is the only small species found in Holland, so I am convinced that the larva of this species was here. Unfortunately I did not succeed in breeding the fly. The puparium was there on the upper side of a small piece of tree bark lying on the ground on the bank of a pond in the forest, on the grassy edge of which numerous *L. furcata* were to be found; all specimens I caught turned out to be females again. The shape the puparium (Figs. 23, 24) is very similar to that of *L. lutea*; the segmental margins of the spinal cord are incised in the same way, but the incisions are less regular at the lateral margins; while in *L. lutea* they are almost rectangular and are usually straight on the outside, here they are often somewhat wider at the end and have a tooth-like protruding point; the same is especially the case with the anterior and posterior

²¹ Wilkinson. 'The pharynx of the *Eristalis*-larva, 1901, *Tijdschr. v. Entom.* XLIX.

halves of the segments; in the latter half the related teeth are directed forward. The incisions in the rear margins, on the other hand, are on the whole much less deep and conspicuous than in *L. lutea*, mostly hardly deeper than wide, and they are deepest near the median line of the body. The upper side is clearly multi-cornered, the edges of the segments are composed of sharply separated round granules. In the front segments the T-shaped suture is pre-formed as a fine line, in the further segments there is a row of granules on each side of the median line, like those that form the fields. These two lines can still be seen in the front part of the 1st abdominal segment. The fine, round circles where the breathing horns penetrate the pupa can be found in the same place as in *L. lutea*.

The puparium differs from that of *L. lutea* in particular by the nature of the 1st and last segment of the hard dorsal tergite. Of the thread-like extensions of the mesothorax, the middle ones are about 0.63 mm. long; between them there are 4 marginal processes, which are drawn into a long point, while *L. flavicauda* has there about 14 closely spaced, straight, yet truncated processes. The lateral filaments are separated from the central ones by 3 similar marginal processes and about half as long (0.35 mm.). Close to this is the marginal papilla of this segment on a rather long stalk.

On the last dorsal segment (i.e. the 7th abdomen segment) the two filaments are 0.65 mm. long, they are separated by about 5 marginal processes of bizarre shape, while *L. lutea* has about 12 of them of regular rectangular shape. The marginal papillae lying outward from them stand at about 0.2 mm. long stems. In *L. lutea* these papillae are scarcely conspicuously stalked and lie almost under or somewhat inward of the long filaments. Most of the marginal incisions in this segment are more or less tooth-like at the tip.

The filaments of the prothorax are about 10 times shorter than those of *L. lutea*, only about 0.07 mm. long, they do not even reach the anterior border of the puparium and are therefore not visible from above, while in *L. lutea* they protrude far from it.

The filaments have the following dimensions in both species:

	<i>L. furcata</i>	<i>L. lutea</i>
Prothorax	0,075 mm	0,75 mm
Mesothorax:		
middle pair	0,63	1—1,3
lateral pair	0,35	0,26
7th Abdom. Segment	0,65	1,3

I don't see any differences in the gullet; the mouth parts are not sufficiently recognizable. The marginal papillae are relatively narrower, otherwise of the same structure as in *L. lutea*, the dorsal papillae somewhat more serrated at the edge. The soft sides of the body under the back shield are granular as in *L. lutea* and have similar lateral papillae.

As far as the later stages of metamorphosis are concerned, shortly before pupation, the legs of the imago can be observed as ringed, conical structures. A newly hatched *Lonchoptera lutea* var. *lacustris* was initially very pale, brownish-white, but the antennae were already very dark. There was no sign of a ptilinum. The wings were already large, the upper side strongly convex, especially at the tip, which was therefore strongly bent

downwards; they were spread out to the side; their front edges formed an angle of about 60°. After a quarter of an hour the wings were completely flat and lay on top of each other on their abdomen.

Inside one of the puparia could be seen a clearly segmented Hymenoptera larva, very spaciouly stored; it agreed with the larva shown by Lubbock, which Lubbock regarded as the developmental stage of the fly. I bred a small parasitic wasp from another puparium.

The eggs of *Lonchoptera* are white (Fig. 25) oval, both in *L. furcata* and in *L. lutea* about 0.6 mm. long and 0.25 mm. broad, somewhat flatter on one side, the wall is very thin, structureless, transparent.

Figure Caption

- Fig. 1. *Lonchoptera tristis* Meig. male. Third tarsal segment of foreleg.
2. *Receptaculum seminis* of *Lonchoptera lutea* Panz. female. a, inner end covered with large cells. b. medial part. c. extended end section.
 3. *Receptaculum seminis* of *Lonchoptera fucata* Fall. female.
 4. Wing of *Lonchoptera*. The piece of vein that has failed in my opinion is indicated by a dotted line.
 5. *Lonchoptera lutea* Panz. hypopygium from ventral aspect. a. epandrium. b. upper lamella. c. subanal plate. d. anus. e. anterior gonapophyses. f. penis.
 6. *Lonchoptera lutea* Panz. upper lamella of the hypopygium, from dorsal aspect.
 7. *Lonchoptera furcata* Fall. hypopygium from ventral aspect.
 8. *Lonchoptera furcata* Fall. hypopygium from dorsal aspect.
 9. *Lonchoptera furcata* Fall. var. tip of the abdomen with hypopygium.
 10. *Lonchoptera tristis* Meig. hypopygium from ventral aspect.
 11. *Lonchoptera tristis* Meig. upper lamella of the hypopygium.
 12. *Lonchoptera tristis* Meig. midleg of the male.
 13. *Lonchoptera pictipennis* Bezzi. hypopygium from ventral aspect.
 14. *Lonchoptera pictipennis* Bezzi. upper lamella of the hypopygium.
 15. *Lonchoptera fallax* n.sp. hypopygium from ventral aspect.
 16. *Lonchoptera fallax* n.sp. upper lamella of the hypopygium.
 17. *Lonchoptera strobli* n.sp. hypopygium from ventral aspect.
 18. *Lonchoptera strobli* n.sp. upper lamella of the hypopygium.
 19. *Lonchoptera strobli* n.sp. midleg of the male.
 20. *Lonchoptera lutea* Panz. Larva, mesothorax to 2nd abdominal segment. a, a: imaginal discs of the lateral flanges; tr. trachea running to the central nervous system; Sp. lateral papillae; Ch.o chordotonal organ.
 21. *Lonchoptera lutea* Panz. pattern of the trachea in the prothorax — 3rd abdominal segment; tr. [tracheal] branches running to the central nervous system.

22. *Lonchoptera lutea* Panz. location of the chordotonal organs. *Sp.* lateral papilla; *Ch.o.* polyscolopic; *Ch.o'* monoscolopic chordotonal organ.
23. *Lonchoptera furcata* Fall. (?), Larva, front end of the body. *Ms.* mesothorax; *Mt.* metathorax; *Abd. 1* 1st abdominal segment.
24. *Lonchoptera furcata* Fall. (?), rear end of the body (7th abdominal segment).
25. Eggs of *Lonchoptera furcata* Fall.