

## Taxonomic remarks on *Callambulyx tatarinovii* (BREMER & GREY, 1852 [1853])

from Transbaikalia

(Lepidoptera, Sphingidae)

by

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**Abstract:** *Smerinthus eversmanni* EVERSMANN, 1854 (POPOFF, in litteris) was described from Transbaikalia, Kiachta, and is considered as a subspecies: *Callambulyx tatarinovii eversmanni* (EVERSMANN, 1854) **comb. et stat. nov.** The population is characterized by distinct sexual dimorphism of the species where ♂♂ are green and ♀♀ are always reddish brown. The distribution of the subspecies is discussed and data on its preimaginal stages are given.

**Zusammenfassung:** *Smerinthus eversmanni* EVERSMANN, 1854 (POPOFF, in litteris) wurde aus Transbaikalia, Kiachta beschrieben und wird als Unterart von *Callambulyx tatarinovii eversmanni* (EVERSMANN, 1854) **comb. et stat. nov.** aufgefaßt. Dies wird durch einen Sexualdimorphismus charakterisiert, der sie von den anderen Arten unterscheidet, bei denen die ♂♂ grün und die ♀♀ immer rotbraun gefärbt sind. Die Verbreitung dieser Unterart wird diskutiert, darüber hinaus werden Angaben über die Praeimaginalstadien gemacht.

**Introduction:** TATARINOV's hawkmoth *Callambulyx tatarinovii* (BREMER & GREY, 1852 [1853]) is a sub-nemoral species ranging to the Transbaikal area, southern Amur Region and Primorie in Russia; outside Russia it is known from northern Mongolia, Korea, northern and eastern China, and Japan (Hokkaido, Honshu) (DERZHAVETS, 1977, 1984; TSCHISTJAKOV, 1981; INOUE, 1982, DUBATOLOV, 1982; MA et al., 1991; ZOLOTARENKO & DUBATOLOV, 1988; PARK et al., 1999; PARK, 2000; ZHU & WANG, 1997; <http://www.jpmoth.org/Sphingidae>). Selected records of the species from the Transbaikal area are known from a very few publications (EVERSMANN, 1854; STAUDINGER, 1892; STAUDINGER & REBEL, 1901; ZOLOTARENKO et al., 2005; GORDEEVA & GORDEEV 2007). In the latter article, short bionomic data of the species are also given. In recent years, some additional data were obtained and they allow us to put forward a new taxonomic decision on the taxon already considered as a brown form or just a rare aberration.

**Historical review:** *Callambulyx tatarinovii* (BREMER & GREY, 1852 [1853]) was described in *Smerinthus* after a single ♀ collected by GASCHKEWITSCH near Peking. It is clearly pointed out that this typical ♀ is characterized by a green ground colour of the forewing and the body. This description is difficult to find, therefore the facsimile is reproduced here (fig. A):

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19. *SMERINTHUS Tatarinovii*. S. corpore subviridi, thorace supra macula mediana viridi obscuriori; abdome pallidiore cingulato. Alis anticis repandis; supra subviridibus, nebulis fasciisque obscurioribus; posticis rufis, angulo ani fascia viridi notato; subtus: alis omnibus subviridibus; anticis vitta basali rufa. Expans. alar. antic. unc.  $3\frac{1}{4}$ .

Fig. A: Faksimile of the original description of *Smerinthus tatarinovii* BREMER & GREY, 1852 [1853], Etudes ent. 1: 58-67, St. Petersburg.

In the same year, the species was again described - the reasons are unclear, but BREMER & GREY (1853: 23) just pointed out:

In den «Etudes entomologiques, rédigées par Victor de Motschulsky» wo wir die Diagnosen der hier als neu beschriebenen Schmetterlinge zuerst bekannt machen, haben sich durch unbegreifliche Irrthümer einige unpassende Namen eingeschlichen, welche hier berichtet sind.

Usually this description has been noted everywhere as the original one. This was bilingual (BREMER & GREY, 1853), with a short Latin diagnosis and a more detailed description given in old German. We also reproduce this here, but especially underline that it is only a RE-description of the species, but not the original description (see fig. B).

One year later, POPOFF (i. l.) (in EVERSMANN, 1854) described the species *Smerinthus eversmanni* after a single ♀, sent him together with dried caterpillars from Transbaikalia (Kiachta) by POPOFF. This species was diagnosed with saturate reddish-brown ground colour without any green hue. The facsimile is also reproduced here (see fig. C). Both typical specimens are kept nowadays in the Zoological Institute of Sanct Peterburg, Russia (ZISP - col. pl. 1: 15, 16).

Soon after description, this reddish-brown specimen was accepted to be a colour form of the typically green *Callambulyx tatarinovii* (BREMER & GREY) (<http://tpittaway.tripod.com/sphinx>). STAUDINGER (1892) described it again from Kiachta, based also on a brown ♀, as „*Smerinthus Tatarinovii* var. *Brunnea*“; the name is surely synonymous to *S. eversmanni* EVERSMANN, 1854 (POPOFF, i. l.). Once again the form was described after a brown ♀ from ‘western Mongolia’, as *Callambulyx tatarinovi versicolor* GEHLEN, 1941. The specimens with yellowish-brown colouration are also attributed to the same form, and such colouration explained by the recessive state of genes (DERZHAVETS, 1984; IZERSKY, 1999), but special investigation to prove this hypothesis was never done. It should be noted, that such [recessive] form is known from Japanese populations where it occurs rarely together with the typical green form (it was originally described from Japan as a colour variation of a ♂ of the second generation, as var. *flavina* AUSTAUT, 1912, is infrasub-

specific) whereas Transbaikal populations are characterized always by green ♂♂ and reddish-brown ♀♀ only (col. pl. 1: 12-14).

## GENUS SMERINTHUS.

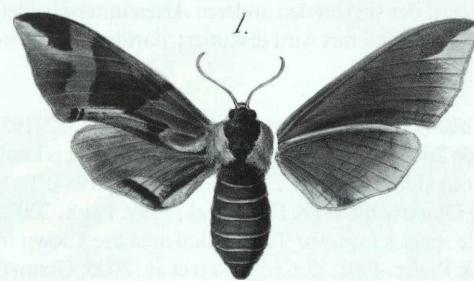
## 57. TATARINOVII. Nobis. Tab. V. Fig. 1.

Corpo subviridi; thorace supra macula mediana viridi obscuriori; abdome pallidiore-cingulato. — Alis anticis repandis; supra subviridibus, nebulis fasciisque obscurioribus; posticis rufis, angulo ani fascia viridi notato; — subtus: alis omnibus subviridibus; anticis vitta basali rufa.

Expans. alar. antic. unc. 3 $\frac{1}{4}$ .

Der Körper ist grünlich. Die weißen Antennen sind durch einen weißen Streifen, welcher quer über den Kopf läuft, verbunden. Von diesem weißen Streifen bis zum Ende des Thorax zieht sich ein großer dunkelgrüner Fleck. Der Abdomen ist am Schluß jedes Gliedes von einem schmalen, helleren Gürtel umzogen. Die Oberseite der Vorderflügel ist hellgrün, mit einem dunkleren breiten Mittelfeld. An der Flügelspitze liegt ein dunkelgrünes, verhobenes Dreieck, dessen Basis der Vorderrand bildet und dessen äußere Ecke die Flügelspitze theilt. Am Außenrande liegt unter diesem Dreiecke ein dunklerer Schatten. Die Hinterflügel sind einfach roth; am Innenvinkel befindet sich ein kurzer grüner Streifen in einem weißen Flecke. Die Unterseite der Flügel ist hellgrün gegen den Außenrand weißlich. Die Vorderflügel sind von der Wurzel aus mit einem rothen Webse versehen, welcher sich bis zur Mitte des Flügels erstreckt, wo derselbe sich allmählig verlängert. Über alle Flügel ziehen sich drei schmale dunklere Streifen, welche auf den Vorderflügeln sehr undeutlich sich zeigen.

V.



1 *Smerinthus Tatarinovii*.

Fig. B: Faksimile of the re-description of *Smerinthus tatarinovii* BREMER & GREY, 1853 (Beiträge zur Schmetterlings-Fauna des noerdlichen China's: 13).

In most publications where the reddish-brown form was noted, only references to the typical specimen can be found (STAUDINGER & REBELL, 1901). New data on the species in the Transbaikalia were published only in the late 20<sup>th</sup> Century (DUBATOLOV, 1982; DERZHAVETS, 1984; ZOLOTARENKO & DUBATOLOV, 1988; AMSHEEV & RUDYKH, 1999). All included only information on green ♂♂ of *C. tatarinovii* (BREMER & GREY), collected by night at artificial light (♀♀ are not attracted by light).

In 1998, the first ♂ specimen of the species was brought to the Laboratory of Animal Ecology of the Institute of General and Experimental Biology in Ulan-Ude. It was a reddish-brown moth collected during the day by Ajuna A. SHODOTOVA (BUDAeva) in the centre of Ulan-Ude city, by shaking of elms. Its colour drawing was published in 2005 in „The Red Book of Burjat Republic“. While other Lepidoptera species feeding on leaves and seeds of the elm (*Ulmus pumila* L.) grown in southern and central part of Western Transbaikalia were included in The Red Book, task-oriented researches of the bionomics of the elm's phytophagous insects were undertaken since 2001. TATARINOV's hawkmoth was among them.

The material collected allows us to make some conclusions. Doubtless, the population of Transbaikalia and neighbouring southern regions has constant and stable character. It is sexual dimorphism in the coloration that all ♂♂ are green there and all ♀♀ are always reddish-brown. The Transbaikal population is widely isolated geographically, and the distance between this area and the nearest location of the nominate subspecies is ca. 1500 km. The area of the taxon with reddish-brown ♀♀ is located in the Selenga Valley and probably reaches Dzhungaria. The easternmost findings of the nominate *C. t. tatarinovii* (BREMER & GREY) are not known outside the Big Chingan and the southern end of Gobi. Therefore, we are attributing the populations of *C. tatarinovii* (BREMER & GREY) from Transbaikalia, the nearest territories of Mongolia and, perhaps, from North-Western China (see <http://tpittaway.tripod.com/sphinx>) to the independent subspecies *C. t. eversmanni* (EVERSMANN, 1854) (POPOFF, i. l.) **comb. et stat. nov.**

*Callambulyx tatarinovii eversmanni* (EVERSMANN, 1854) (POPOFF, i. l.) **comb. et stat. nov.** (col. plate 1: 1-15)

„SMERINTHUS EVERSMANNI Popoff“ EVERSMANN, 1854, Bulletin de la Société Impériale des Naturalistes de Moscou 2: 182, pl. 2: 5. Type locality: [Russia, Transbaikalia] Kiachta. Holotype ♀ (by monotypy) (ZISP - col. pl. 1: 15).

Materials: All material (more than 1000 ♂♂ and about 20 ♀♀) were collected within an area of *Ulmus pumila* L. in the limits of Selenga mountains, in the steppes of Burjat Republic and Transbaikalia Region (map 1). ♂♂ were attracted by night to artificial light, and all ♀♀ were collected by day shaking elms. The caterpillars were reared in the laboratory, and pupae hibernated also under laboratory conditions.

In the work, the material of the Laboratory of Animal Ecology of the Institut of General and Experimental Biology of Ulan-Ude, as well as the Zoological Museum of the Institute of Systematics and Animal Ecology of Novosibirsk (both Russia) was examined. Photos of the typical specimens of both taxa were sent to us from the Zoological Institute of the Russian Academy of Sciences (ZISP) in St. Petersburg. The REM-illustrations were obtained by the use of a Scanning Electron Microscope TM-1000 of the Institute of General and Experimental biology of Ulan-Ude.

The species *C. tatarinovii* (BREMER & GREY) is known from Transbaikalia from the following localities:

Burjat Republic: 1. Kiachta District, Kiachta city environs (coll. EVERSMANN in ZISP): 1 ♀ (EVERSMANN, 1854);

2. Kiachta District, river Sava valley, 5 km SE of vill. Ist'-Kiachta, 13.VI.2007 (leg. GORDEEV): ca. 100 ♂♂;

3. Kiachta District, river Chikoy valley, vill. Duren (12 km SE of vill. Ust'-Kiran), 28.VI.1986 (leg. B. P. ZAKHAROV): 1 ♂;

Schon seit mehr als drei Jahren besitze ich eine schöne Sphinx, nebst zwei ausgeblasenen Raupen derselben, aus der Umgegend von *Kiachta*. Sie ist mir durch Herrn Popoff mit der Bedeutung zugeschickt worden, dass er ihr meinen Namen beilege im Fall die Species neu sei. Da ich ihm dieses damals bejahend beantwortet habe, so setzte ich voraus, dass er, oder ein Anderer, diese schöne Bereicherung der russischen Schmetterlingsfauna bekannt machen würde. Dieses ist aber bis jetzt, soviel ich weiß, nicht geschehen, und so nehme ich mir die etwas kitzelige Freiheit es selbst zu thun.

#### 4. *SMERINTHUS EVERSMANNI* Popoff.

Fig. 5.

*Sm. alis flexuosis; anticis carneis: lunula discoidali, strigis duabus medianis maculaque apicis triquetra bruno-ferrugineis; macula longitudinali nigro-coerulea marginis postici; — posticis sanguineo-roseis: margine interno coeruleo-lituraque transversa ferrugineo-brunnea anguli analis.*

Ein Weibchen. — Grösse von *Sm. Ocellata*, die Vorderflügel am Aussenrande etwas breiter. Fühler fadenförmig, weiss, etwas in's Fleischfarbene ziehend. Kopf und Thorax schön rostbraun, mit hellen, weisslich fleischfarbenen Schulterdecken, und unter diesen, am hinteren Ende, noch ein flügelförmiger dreieckiger Fleck von derselben weisslichen Farbe, dessen Haare flach anliegend nach hinten gerichtet sind, indem die Haare des Thorax aufrecht stehen. Die Ringe des Hinterleibes haben ein sanftes Graubraun, mit hell fleischfarbenen, oder weisslichen Hinterrändern.

Vorderflügel mit etwas geschwungenem Aussenrande; — fleischfarben, am Aussenrande mit bräunlichem Stahlblau verwaschen; in der Mitte des Hinterrandes ein länglicher, schmaler stahlblauer Fleck. Ein grosser dreieckiger rostbrauner Fleck befindet sich in der Spalte des Flügels, und theilt diese in zwei Hälften, von denen er die obere einnimmt; darunter ein rostbrauner Schatten. Ausserdem sind noch zwei rostbraune Querstreifen, welche den Vorderrand in drei gleiche Theile theilen; der äussere erreicht den Hinterrand an der äussersten Spitze des oben genannten stahlblauen Fleckens, der andere endet auf der Mitte desselben, und von dort wurzelwärts ist dieser Fleck durch einen länglich dreieckigen dunkelrostbraunen Streifen begrenzt. Die kleine Querader ist rostbraun angelegt.

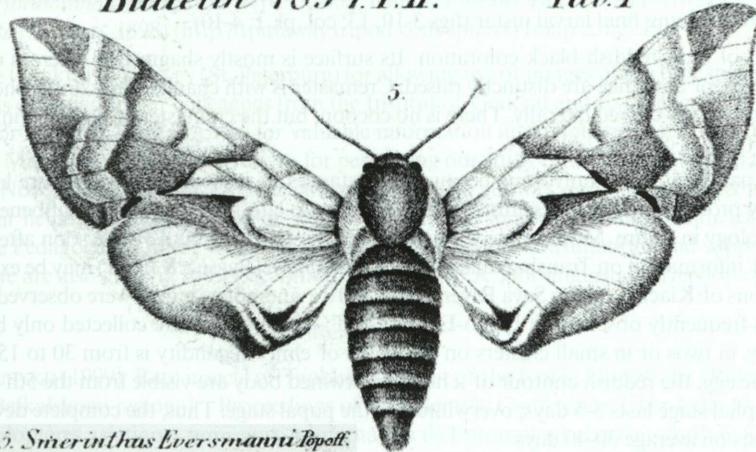
Die Hinterflügel haben ebenfalls einen geschwungenen Aussenrand. Ihre Farbe hält das Mittel zwischen Blutrot und Rosenrot; der Aussenrand ist etwas mit Stahlblau verwaschen; am Innenrande ist das Stahlblau heller, weisslich, und hat einen schwärzlichen Querschatten. Vom Afterwinkel geht aufwärts ein schmaler dunkelrostbrauner Fleck, der sich nicht weit vom Aussenrande entfernt, und dann mit der Grundfarbe verwaschen ist.

Die Unterseite der Flügel ist ockergelb, mit Röthelrot verwaschen, am Aussenrande mehr greis. Die Vorderflügel haben auf ihrem zweiten Drittel einen röthlichen verwaschenen Querstreifen. Die Hinterflügel haben drei parallele und geschwungene Querstreifen von derselben röthelrothen Farbe.

Die Raupe kommt der von *Sm. Populi* und *Ocellata* am nächsten; ihre grüne Haut ist ebenso gekörnt, und der Kopf hat dieselbe dreieckige Gestalt; auch ist das Horn nicht verschieden; aber die Querstreifen sind eben so gefärbt wie bei der Raupe von *Sphinx Ligustri*.

Bulletin 1854 PII.

Tab.I

5. *Smerinthus Eversmanni* Popoff.Fig. C: Faksimile of the original description of „*SMERINTHUS EVERSMANNI* Popoff“ by EVERSMANN (1854)

4. Kiachta District, river Chikoy valley, 12 km NE of vill. Ust'-Kiran, Maly Kumyn Mt., elm bush, 10.VII.1966 (leg. E. E. ALEKSEEEVA): 1 ♂;
5. Selenga District, vill. Selendum outskirts, elm bush near a road, 26.VI.2005 (leg. S. G. RUDYKH): 4 ♂♂, 5 ♀♀;
6. Selenga District, vill. Taezhnyj, 9. and 19.VII.1984 (leg. P. Ya. USTJUZHANIN): 2 ♂♂;
7. Ivolga District, river Gilberi valley, vill. Kokorino, 1. and 6.VII.1973 (leg. L. G. MOROZOVA): 2 ♂♂ (DUBATOLOV, 1982);
8. Ivolga District, vill. Tapkhar outskirts, 35 km SE Ulan-Ude, petrophyous elm bush, 18.VII.1996 (leg. S. G. RUDYKH): 1 ♂;
9. Ivolga District, 25 km SE Ulan-Ude, Shaman Mts, left bank of Selenga riv., elm bush, 9.VI.2008: 3 ♂♂; 6.VII.2008 (leg. GORDEEV): 1 ♂;
10. Ulan-Ude: orchards, 25.VII.1972 (leg. L. A. KANTER): 1 ♂; elm bush in city park, 8.VII.1998 (leg. A.A.SHODOTOVA): 1 ♀; elm bush on Trubacheeva street, 3.VII. 1999 (leg. S. G. RUDYKH): 1 ♂;
11. Zaigraevskiy District, vill. Onokhoj outskirts, Intigrinova Pad' (Onokhoj-Shibir'), elms in lower part of stepped hill (southern exposition), 29.VI 2005 (leg. GORDEEV): 1 ♂, 1 ♀;
12. Zaigraevskiy District, 14 km NE vill. Onokhoj, vill. Dobo-Enkhor outskirts, Dobo-Enkhor Pad', elm bush on stepped slope, 9.VIII.1998 (leg. T. V. GORDEVA): 2 ♂♂; 14.VI.2008: 21 ♂♂, 1 ♀; 16.VI.2008: 13 ♂♂, 1 ♀; 15.VII.2008: 4 ♂♂; 2.06.2009: 1 ♂;

4.06.2009: 2 ♂♂; 13.06.2009 (leg. GORDEEV): 3 ♂♂, 1 ♀.

Transbaikal Region: 13. Krasnochikoy District, vill. Ust'-Urluk outskirts, elm bush in the river Chikoy Valley, 27.VI.2009 (leg. GORDEEV): 14 ♂♂.

### Description

**Imago ♂** (col. pl. 1: 12, 14): Ground colour is dark green with a marble light green patterning on the forewings consisting of vague fasciae and triangular spots. Hindwings are pinkish-red with a large dark anal spot bordered with yellowish or off-white scales. Forewing length is 31 - 34 mm.

♂ **genitalia** (fig. 14): Uncus cone-shaped, elongated with a swamped apex; gnathos is lost. Saccus is sclerotized, proximally teardrop-shaped. Juxta is band-shaped, concave, with deeply bifurcate ends, and ventrally is with a sclerotized tapered process fused with basal parts of sacculus. Sacculus is massive, of rounded-conical shape, with a flattened distal protuberance covered apically with short thorns curved medially. Costa of the valva is heavy sclerotized, with a membranous swollen basis densely covered with thorns and setae. Top of the valva is slightly curved dorsally, membranous, looking like a narrow lobe with weakly protruded thorned apex. Aedeagus is slender and long (more than 2 times longer as the length of a valva) with the coecum lost. Oblique top of the aedeagus is moving into a slender and elongate sclerotized apical spur with 5-6 rows of the smaller and larger thorns. Vesica is bilobed, compact.

**Imago ♀:** Ground colour is reddish-brown with a patterning generally identical to that of a ♂. Hindwings are pinkish-red, more pinkish than in the ♂, with a large dark anal spot bordered with yellowish or off-white scales. Forewing length is 37 - 38 mm (col. pl. 1: 12, 13).

♀ **genitalia** (fig. 15): Papillae anales are widely rounded. Apophyses anteriores 2,5 times shorter than the posteriores. Sternum VIII is undivided, with sclerotized, folded ventral margin. Dorsal wall of the antrum is concave, proximally forming a small, sclerotized, wrinkled pocket. Ventral wall of the antrum is heavy sclerotized, elongated caudally and is protruded from the margin of the sternum VIII as a narrow process with a forked apex. Anthrum is slender, sclerotized, straight, coming into the ductus bursae in a swollen bent branch bearing thin ductus seminalis. Ductus bursae is heavily sclerotized, slender, a bit swollen in distal half, with 2 short spurs in a vestibule of corpus bursae. The corpus bursae is of irregular heart-conical shape, without signa.

**Egg** is roundly ellipsoid, laterally weakly flattened, light green when a caterpillar forms inside and colourless after hatching. The egg chorion is thin, transparent and pearly, without distinct microsculpture and patterning. By magnification (x 600-2000), chorion is granulate, with widely separated tubercles and innumerable pores (aeropyles?) between them (figs 1, 2; col. pl. 1: 1, 2).

**Caterpillar** is fully developed after about 1 month and has 5 instars, growing from 5 mm to 5 cm and more. The first instar lasts 2-5 days, all others about 7 days each. General colouration barely changes throughout all stages, and caterpillar is light green with a reddish horn in all instars. Body surface is covered with small whitish tubercles, more dense along dorsal and oblique lateral lines. In older instars, purple colouration is developed along these lines in some specimens, especially with later pupating dates; we suppose, it is more typical therefore for ♀ caterpillars but no special observation to prove this statement was made.

Larval instars can be defined precisely according to the shape and size of the head capsule. In the first instar, the head of *C. tatarinovii* (BREMER & GREY) is spherical, weakly flattened frontal. But later, after each moulting, the head becomes more and more triangular because parietal apices extend with each instar. This epicranial index (as a ratio between length of a front and suture of a vertex - RIPLEY, 1924) is correspondingly 1,25; 1,00; 0,83; 0,48; 0,37. Surface of the head capsule is covered with tapered tubercles, rounder in the final instar. Apically, each tubercle bears a sensillum in a special dimple. It is ramified in early instars and simple in final instars. Besides that, in L2, L3 and L4, apices of vertex bear densely closed protuberances which are lost in L5, and their absence is a safe character defining final larval instar (figs 3-10, 13; col. pl. 1: 4-10).

**Pupa** is with hard cover of dark reddish-black coloration. Its surface is mostly shagreened whereas only the cases of wings and legs are finely folded. Cases of antennae are distinctly raised. Cremaster is with changeable acanthophorous sculpture. Generally it bears 2 or 3 pairs of short spines curved laterally. There is no cocoon, but the cremaster of an overwintering pupa is wrapped with parchment-like threads (fig. 11; col. pl. 1: 11).

**Bionomics:** The species can be stated a univoltine because no instances of a second generation are known to us. However, fresh moths occur over a very prolonged period in nature, from early June to late July, suggesting that benefit may be gained by special observation of its phenology in future. Moths mate within a week after hatching, and ♂♂ die soon after that, whereas ♀♀ live about a month. The paucity of information on Transbaikalian ♀♀ of *C. tatarinovii* (BREMER & GREY) may be explained by their indifference to light. So, in the environs of Kiachta on the Sava River, about 100 ♂♂ and not a single ♀ were observed by trapping on 13.VI.2007. The same situation was frequently observed in Dobo-Enkhor Pad', where all ♀♀ were collected only by the shaking of elms. Fertilised ♀♀ laid eggs singly, in twos or in small clusters on the leaves of elm; ♀ fecundity is from 30 to 150 eggs. Larval development lasts 7-10 days within the egg; the reddish contour of a horn and twined body are visible from the 5th day. Pupation takes place in the soil and the pronymphal stage lasts 3-5 days; overwinters in the pupal stage. Thus, the complete development of the larva from hatching to pupation lasts on average 30-40 days.

All observations for larvae were made on the caterpillars reared from eggs; no caterpillars were found in nature. This may be explained because it feeds in the crown of elms; besides that, the cryptic colouration camouflages the caterpillar completely and the caterpillar holds tenaciously to the twigs due to powerful hook crowns on the prolegs and therefore is not dislodged by shaking. The reared caterpillars fed only on the leaves of *Ulmus pumila*, and ignored the leaves of other elms.

**Distribution:** This connection of the species with the local Transbaikalian elm, as well as an affinity of biotopic and climatic preferences between *U. pumila* and *C. tatarinovii* (BREMER & GREY), surely constrains the area of this hawkmoth to Transbaikalia. The limits of its area in the Selenga Valley in Western Transbaikalia are outlined by the growing range of *U. pumila*. Here, the northern and eastern limits of *C. tatarinovii* (BREMER & GREY) distribution are recorded as the middle and lower course of the Selenga river and its right tributaries Uda and Chikoy. Hence, in Eastern Transbaikalia, in spite of huge plantations of elm found about 250 km eastwards of the Khentey-Chikoy mountain block, the hawkmoth is completely absent. Such rupture in its distribution between 108° and 125° of the northern latitude may be explained by unacceptable climatic factors of this part of the Transbaikalia (map 1). A similar gap in its area is known also for southern areas. Thus, in the central part of Mongolia, in spite of sporadically occurring plantations of the elm there, *C. tatarinovii* (BREMER & GREY) is also unknown. It is known from 2 opposite locations from Mongolia. One of them, Muren, is situated in the western part of the country, near the upper course of the Selenga River; another

one - Derkhin-Tsagan-Obo - in the eastern part, in the region of Chingan. Unfortunately, only ♂♂ are known from both locations and a brown ♀ described as ssp. *versicolor* GEHLEN, 1941 from 'western Mongolia' originating from NE China (Inner Mongolia, see below). Hence, the situation of the Muren locality 400 km westwards from Kiachta in the continuation of elm plantations of Selenga, allows corridor access for the same Transbaikalian population of *C. t. eversmanni* (EVERSM.). The second location, - Derkhin-Tsagan-Obo - is separated from Selenga by more than 1000 km to the east up to the Great Chingan Mountains, a territory much influenced by the contrasting continental climate of the Gobi Desert. Thus, this easternmost finding of the species on that latitude is likely to be the most western limit of distribution for the nominate subspecies. Accordingly, the area of distribution of TATARINOV's hawkmoth does not completely correspond with the range of its hostplant. This applies not only for the monophagous *C. t. eversmanni* (EVERSM.), but also for the nominate subspecies having a wider food tolerance. From the many Chinese populations of *C. tatarinovii* (BREMER & GREY) only one is worthy of special note. It is the Dzungar population from Shihézi with brown ♀♀ (see <http://tpittaway.tripod.com/sphinx>), but information is very poor. Taking into consideration its extreme western position (90° of the northern latitude), it may be also attributed to *C. t. eversmanni* (EVERSM.).

### Systematics

Thus, 3 subspecies can be considered nowadays within *Callambulyx tatarinovii* (BREMER & GREY, 1852 [1853]):

1. *Callambulyx tatarinovii tatarinovii* (BREMER & GREY, 1852 [1853])

*Smerinthus Tatarinovii* BREMER & GREY, 1852 [1853], Études ent. 1: 62. Type locality: [China, Peking]. Holotype ♀ (ZISP).

= *Callambulyx tatarinovi* [sic!] *coreana* GEHLEN, 1941, Ent. Z. 55: 178. Type locality: Nord-Korea, Seishin. Syntypes ♂♂, ♀ (coll. GEHLEN).

The nominate subspecies with both sexes green, ranging from Far East of Russia to Korea and north-eastern China.

2. *Callambulyx tatarinovii gabyae* BRYK, 1946

Arkiv för Zoologi 38A: 71. Type locality: Japan [Honshu, Nagano]. Holotype ♂ (Riksmuseet Stockholm).

= *Smerinthus tatarinovi* [sic!] MÉN. [sic!] *v. flavina* AUSTAUT, 1912, Int. Ent. Z. Guben 6: 89, infrasubspecific. Type locality: Japan. Holotype ♂.

= *Callambulyx tatarinovii japonica* EICHLER, 1965, Reichenbachia 5: 21, figs 1, 3. Type locality: N-Japan, Hokkaido. Holotype ♂ (coll. EICHLER, now in Entomologisches Museum EITSCHBERGER, Marktleuthen).

The insular Japanese subspecies with both sexes green, but with ♀♀ sometimes also brown (see <http://jpmoth.org/Sphingidae>).

3. *Callambulyx tatarinovii eversmanni* (Eversmann, 1854)

„*Smerinthus Eversmanni* POPOFF“ EVERSMANN, 1854, Bulletin de la Société Impériale des Naturalistes de Moscou 2: 182, pl. 2: 5. Type locality: [Russia, Transbaikalia] Kiachta. Holotype: female (ZISP).

= *Smerinthus Tatarinovii* var. *Brunnea* STAUDINGER, 1892, Lép. Mém. 6: 238. Type locality: Kiachta. Holotype ♀ (originally is given "aus der SOMMER'schen Sammlung").

= *Callambulyx tatarinovi* [sic!] *versicolor* GEHLEN, 1941, Ent. Z. 55: 178. Type locality: [China, Inner Mongolia] «Westliche Mongolei» [Ordos Province, Kwei-hwa-tschiöng]. Holotype ♀ (Zoologische Staatssammlung München).

The subspecies with green ♂♂ and reddish-brown ♀♀, distributed in Western Transbaikalia and Mongolia, and likely also in north-western parts of China (<http://tpittaway.tripod.com/sphinx>; <http://cate-sphingidae.org>; [http://zsm.mwn.de/lep/sphin\\_typen.htm](http://zsm.mwn.de/lep/sphin_typen.htm)).

Two more taxa were described originally as subspecies of *C. tatarinovii* (BREMER & GREY): *sichangensis* CHU & WANG, 1980 (type locality: China, Sichuan) and *formosana* CLARK, 1935 (type locality: China, Taiwan). But nowadays they are considered as subspecies of the related *C. poecilus* (ROTHSCHILD, 1898) (<http://tpittaway.tripod.com/sphinx>) (map 2; fig. 19).

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## Internet resources:

<http://tpittaway.tripod.com/sphinx>

<http://flickr.com/groups/sphingidae/pool>

<http://jpmoth.org/Sphingidae>

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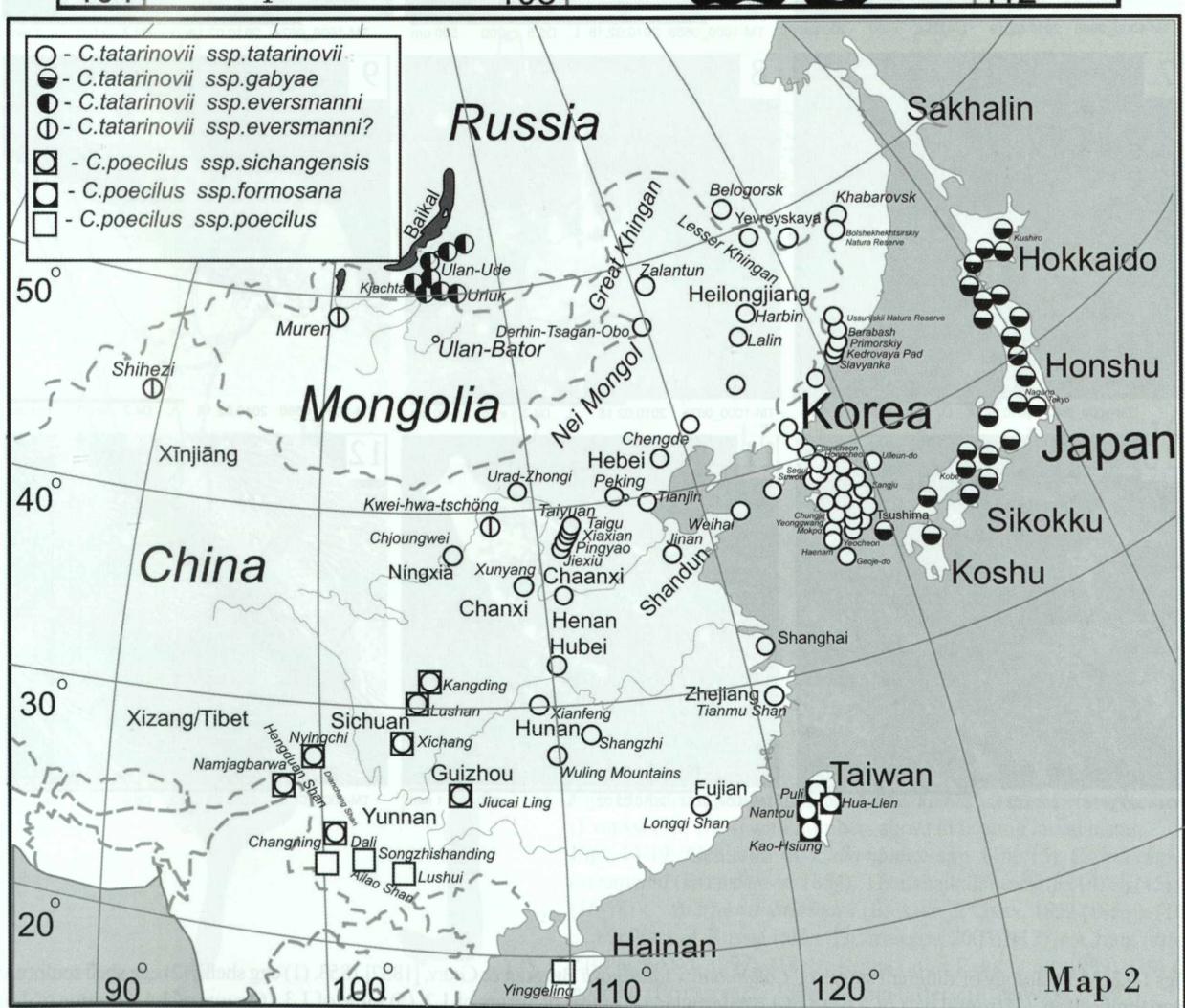
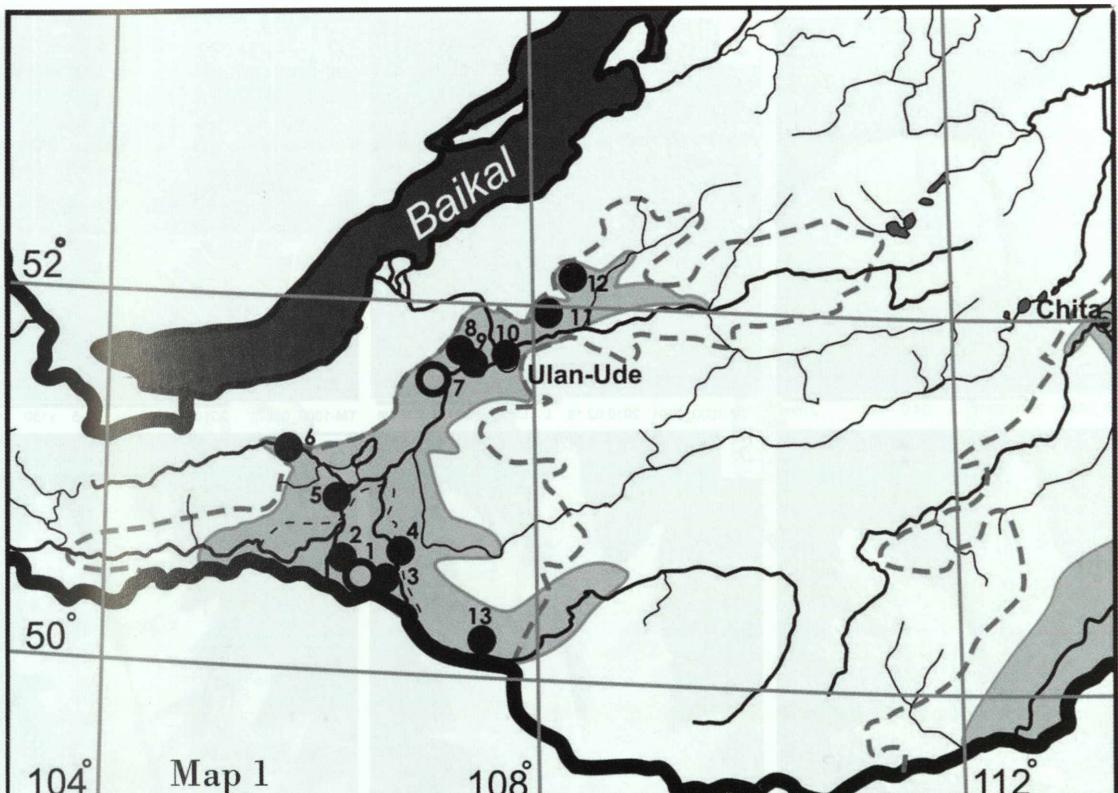
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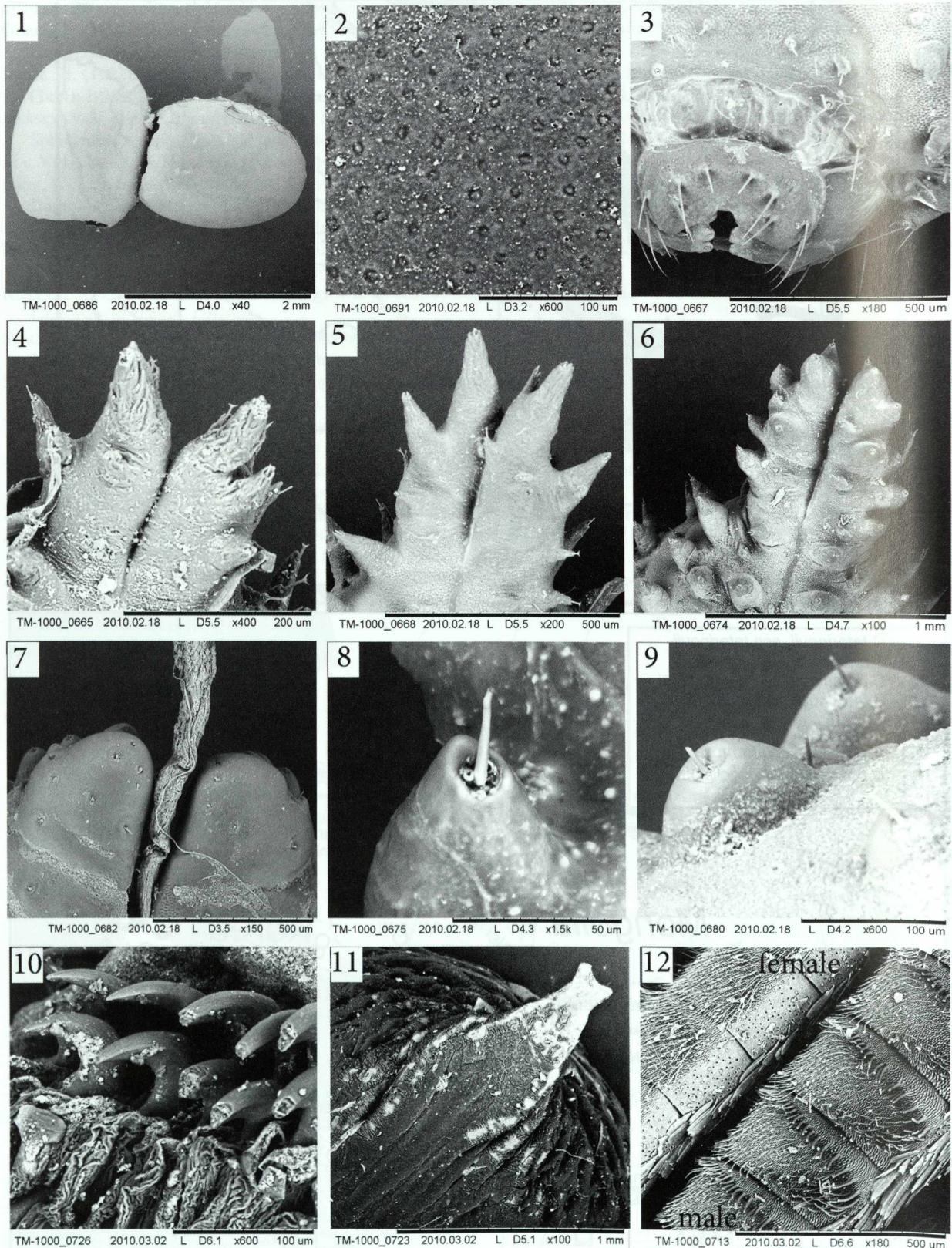
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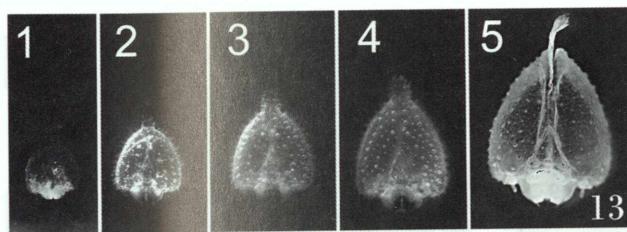


Map 1: Distribution of *Callambulyx tatarinovii* BREMER & GREY, [1852] 1853 in Transbaikalia. Filled circles - original data; clear circles - literature data; grey filled area - distribution of *Ulmus pumila*.

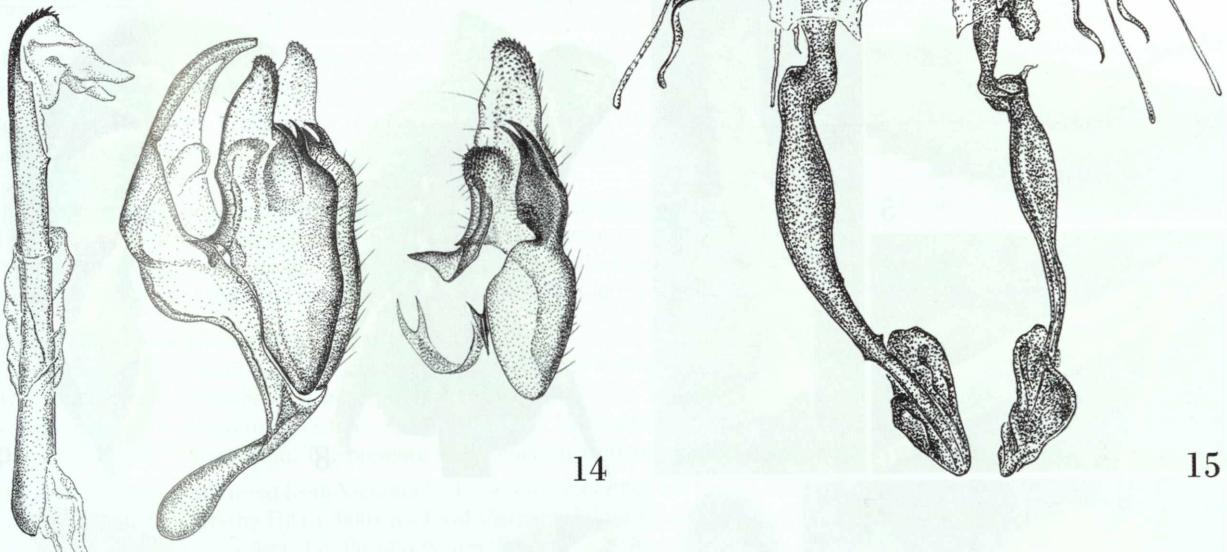
Map 2: Distribution of *Callambulyx tatarinovii* BREMER & GREY, [1852] 1853 and *C. poecilus* (ROTHSCHILD, 1898).



Figs 1-12: Morphology of different stages of *Callambulyx tatarinovii* BREMER & GREY, [1852] 1853. (1) egg shells, (2) egg shell sculpture by magnification, (3) frontal part of a head of L3 caterpillar, (4) apices of vertex of L2, (5) same of L3, (6) same of L4, (7) same of L5, (8) tubercular sensillae of L3, (9) same of L5, (10) crown of prolegs in L3, (11) pupal cremaster, (12) ♂ and ♀ antennae magnified.

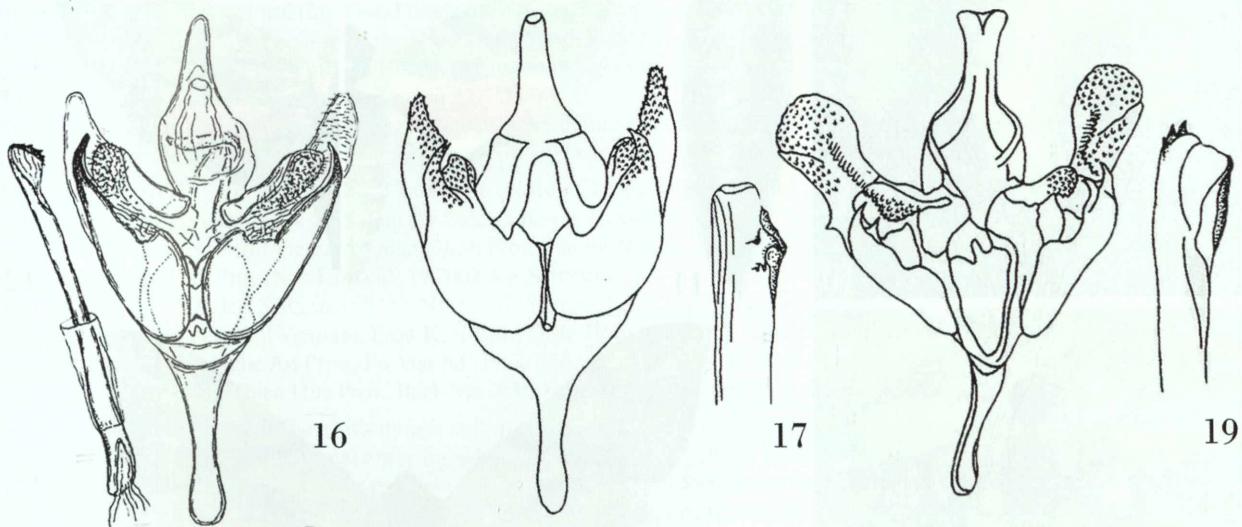
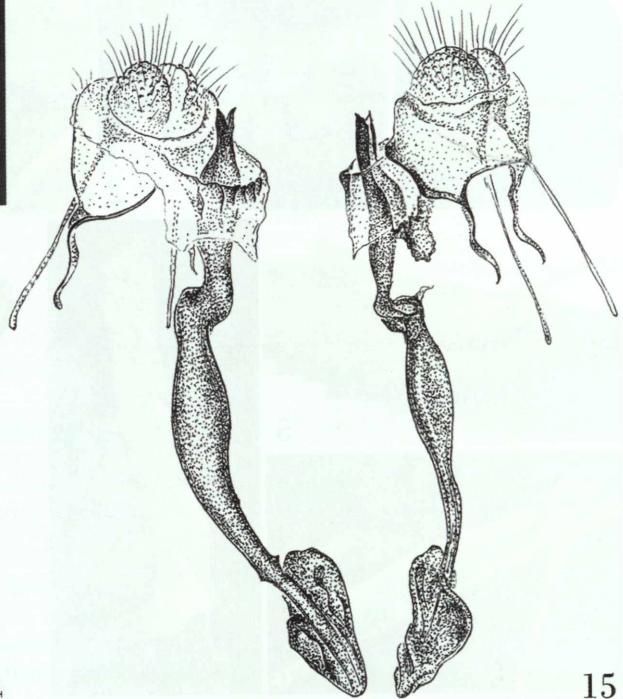


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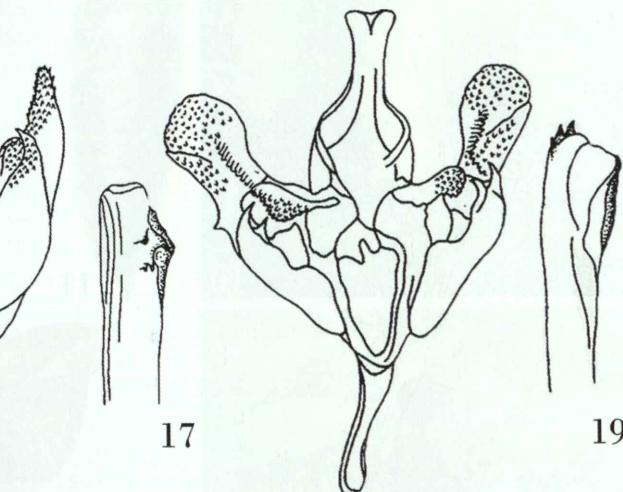
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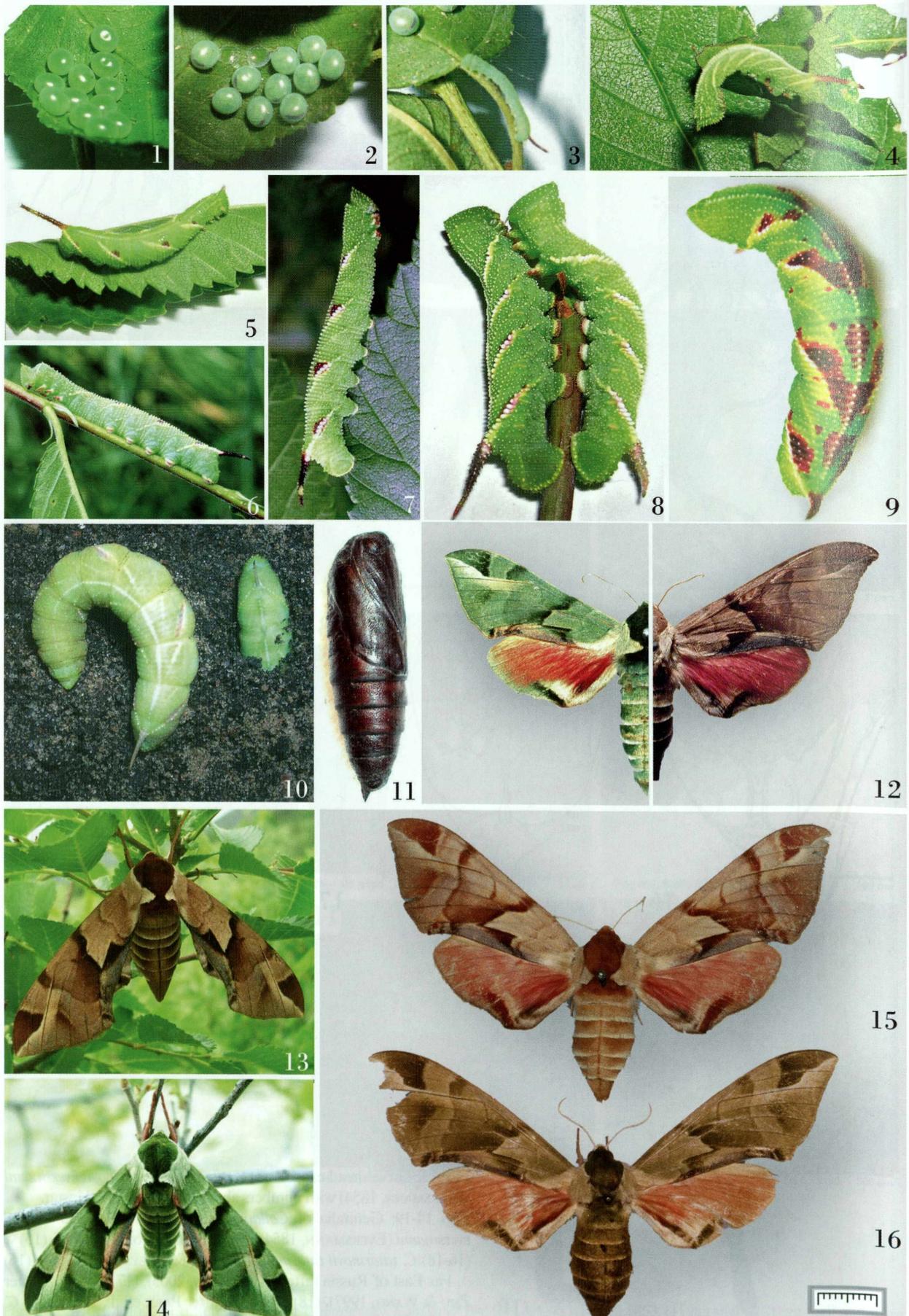
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19



18

Fig. 13: Larval head capsules of *Callambulyx tatarinovii eversmanni* (Eversmann, 1854) with numbers above indicating larval instar.  
 Figs 14-19: Genitalia of *Callambulyx* spp. (14, 15) *C. tatarinovii eversmanni* (Eversmann, 1854), Thansbaikalia (orig.); (14) ♂, (15) ♀, (16-18) *C. tatarinovii tatarinovii* (Bremer & Grey, 1852 [1853]); (16) ♂, Far East of Russia (after Tschitjakov, 2003), (17) ♂, China (after Zhu & Wang, 1997), (18) ♂, Korea (after Park et al., 1999), (19) *C. poecilus* (Rothschild, 1898), China (after Zhu & Wang, 1997).



Figs 1-15: *Callambulyx tatarinovii eversmanni* (Eversmann, 1854). (1) eggs, (2) eggs shortly before larval hatching (3) freshly hatched L1, (4) L2 caterpillar, (5) L3, (6) L4 by moulting, (7) L4, (8) L5, (9) L5 with extremely developed purple pattern, (10) pronymhal stage, (11) pupa, (12) ♂ (left) and ♀ (right) showing sexual dimorphism, (13) ♀ in resting position, (14) ♂ in resting position, (15) holotype ♀ of „*Smerinthus eversmanni* Popoff“ Eversmann, 1854 (ZISP), (16) holotype ♀ of *Smerinthus tatarinovii* Bremer & Grey, 1852 [1853] (ZISP). Photos by S. RUDYKH (1-3, 5, 7-9,) by S. NEDOSHIVINA and A. SOLOVYEV (15, 16) and orig. Scale bar for the types is 1 cm.

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