

Data to the *Eupithecia* fauna of Asia (Lepidoptera, Geometridae)*

by A. M. VOJNITS, Budapest

Abstract — *Eupithecia comparanda* sp. n., *E. ingrata* sp. n., *E. repetita* sp. n., *E. infecunda* sp. n. shown from Pakistan, *E. producta* sp. n., *E. invicta* sp. n. and *E. likiangi* VOJNITS shown from North India. *E. recens* DIETZE, an erroneous identification from Japan; *E. repentina* VOJNITS et DE LAEVER bona species; *E. virgaureata invis*a BUTLER stat. n. (sec. INOUE), erroneous; *E. invis*a BUTLER = sp. inquierenda. *E. bohatschi* STAUDINGER = *E. tuvinica* VIIDALEPP, syn. n. *E. viidaleppi* sp. n. and *E. sachalini* sp. n. from the Far East. *E. undata* FREYER, an erroneous identification from Mongolia (= *E. fennoscandica* Knaben). With 20 figures.

MR. G. EBERT, Karlsruhe, has kindly sent me for identification a smaller series of *Eupithecia* specimens collected in Pakistan and North India. The study of the material resulted in the detection of some new species and the demonstration of a rare species from a new locality.—Studying also INOUE's excellent works on the *Eupithecia* species of Japan (1979, 1980), I found some misinterpretations; of these I propose to discuss (or solve) those concerning *Eupithecia recens* DIETZE and *E. invis*a BUTLER.

One of VIIDALEPP's works (1976) called my attention to the misidentifications concerning *E. bohatschi*, a species giving its name to a group recently proved to be very rich in species and of considerable complexity, a fact which may give rise to problems with regard to the interpretation of the entire group. The revision resulted in the synonymization of a species described by VIIDALEPP and the additional description of two new species.

In one of my papers on the geometrid moths of Mongolia (VOJNITS 1975), I have shown *Eupithecia undata* FREYER from that country. This, too, proved to be an erroneous identification, because the specimens in question represent *E. fennoscandica* KNABEN.

I. NEW AND RARE *EUPITHECIA* SPECIES FROM PAKISTAN AND NORTH INDIA

1. *Eupithecia comparanda* sp. n. (Figs. 1–2)

(Derivation of specific name: comparandus = to be compared)

D i a g n o s i s — Average alar expanse of male fore wings 20 mm, extreme values 19 and 21 mm (based on 6 specimens); that of females 21 mm, extreme values 15 and 25 mm (based on 4 specimens). Wings wide, basic colour a light yellowish grey. Fore wing with ante- and postmedians as wide, zig-zaggy, whitish stripes. All other pattern elements black, dark grey or blackish brown. A line dividing median field and delimiting, as it were, lower third of median field very marked. Transverse stripe in basal field broken. Veins black in terminal field. Hind wing with outer transverse stripe wide and sinuous, inner one evanescent. Discal spot minute. Underside of wings yellowish grey, shiny. Cilia short, yellowish grey, striated grey.

Genitalia. ♂: Valvae arcuate, both dorsum and ventrum arched. Apex obtuse. Uncus short and wide. Vinculum robust. Aedoeagus small, thin, usually bent, containing one chitinous spine. Sternite VIII incised nearly to its base, the lateral arms heavily sclerotized (Fig. 1).—♀: Bursa copulatrix spherical, evenly padded with minute chitinous spines. Cervical part of bursa very long,

* Studies on Palaearctic *Eupithecia* Species, XV.

tubiform, sclerotized. Tergite VIII quadratic. Both anterior and posterior apophyses short. Papillae anales small and very densely setose (Fig. 2).

Biology—First stages and foodplant unknown. All known imagos have been captured in July.

Distribution — Known from Pakistan. Locus typicus: Swat, Gabral valley, 2100 m.

Specific differences — Standing nearest to *Eupithecia venosata* F., the new species differs externally mainly by the more greyish tint of the basic colour and the more marked pattern. The genitalia are also similar, but those of the new species display an overall heavier sclerotization and more robust configuration.

Holotype ♂: "W-Pakistan Swat, N v. Kalam Gabral-Tal, 2100 m 6.-9.7.1969 G. Ebert leg." "Gen. prep. No. 12.093 ♂ Dr. A. Vojnits Budapest TTM". Paratypes: with the same data: 4 ♂♂, 3 ♀♀; Swat, Kalam, 2000 m, 9.7.1969, 1 ♂, 1 ♀. — Holotype deposited in the Landessammlungen für Naturkunde, Karlsruhe, paratypes in Karlsruhe and in the Hungarian Natural History Museum, Budapest.

Slides: Nos. 12.093, 12.094, 12.095, 12.096, 12.097, 12.101 (♂♂), 12.098, 12.099, 12.100, 12.102 (♀♀); gen. prep. Á. Mészár and A. Vojnits.

2. *Eupithecia producta* sp. n. (Fig. 3)

(Derivation of specific name: productus = elongated)

Diagnosis — Average wing expanse 19 mm, extreme values 18 and 20 mm (based on 4 female specimens). A species with elongated wings: apex of fore wing elongated, hind wing short. Basic colour of fore wing yellowish brown. Antemedian hardly, postmedian obscurely, discernible.

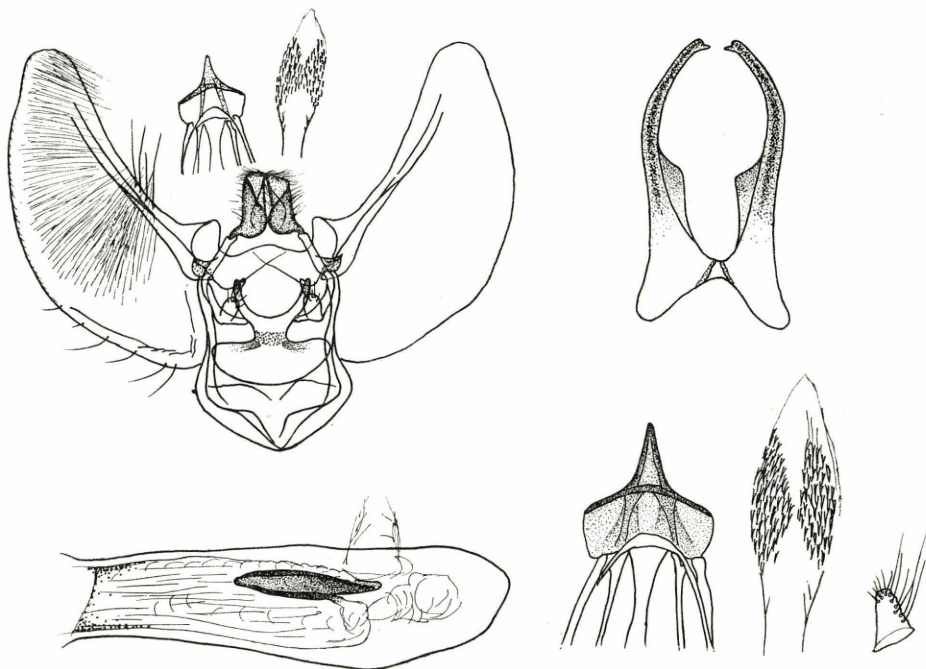


Fig. 1. Male genitalia and sternite VIII of *Eupithecia comparanda* sp. n.

Discal spot large, robust, black, rod-shaped. Hind wing yellowish white, transverse stripes brown to greyish brown. Discal spot small, round. Underside of wings yellowish, pattern elements brown. Cilia medium elongated, yellowish brown, striated.

Genitalia. ♀: Bursa copulatrix pyriform, heavily sclerotized, wall rugose, interior unevenly padded with robust spines. Antrum wide, caliciform, sclerotized. Sternite VIII quadratic. Anterior and posterior apophyses short and thick. Papillae anales elongated (Fig. 3). — ♂: unknown.

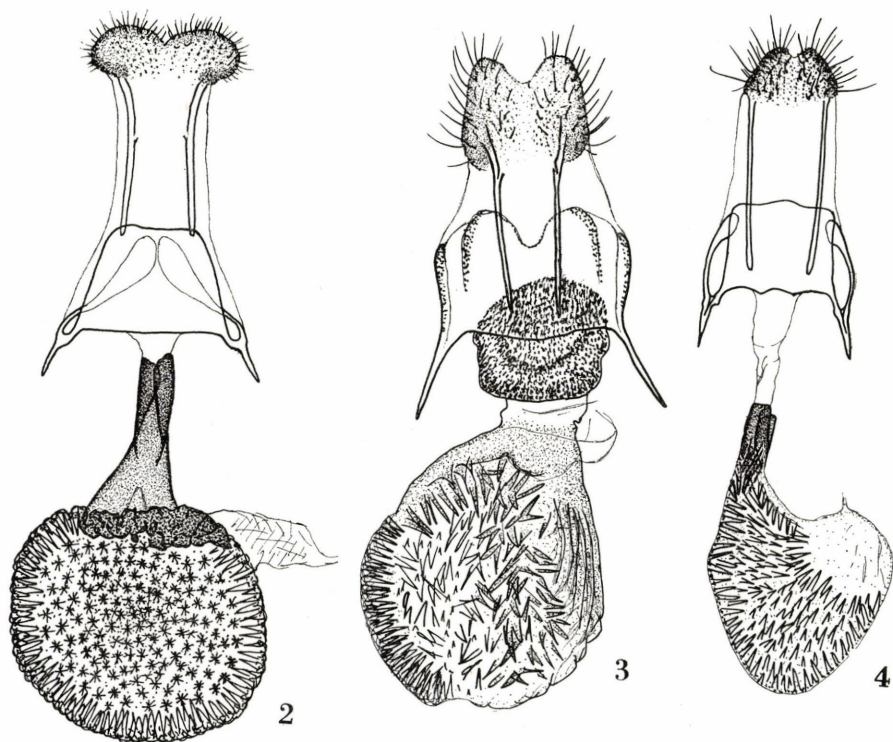
Biology — First stages and foodplant unknown. All known specimens have been collected in September. Presumably a bivoltine species.

Distribution — Occurring in North India; locus typicus: Kumaon, Bhim valley, 1450 m.

Specific differences — To some extent, the new species resembles *Eupithecia indigata* HBN., but it has considerably more elongated wings, the apex is more drawn out, the discal spot conspicuous and rod-shaped, the basic colour darker, the female genitalia are completely different.

Holotype ♀: "Nord-Indien Kumaon Bhimtal (Nainital), 1450 m 23.9.1973, Lichtfang leg. S. Richter" "Gen. prep. No. 12 124 ♀ Dr. A. Vojnits Budapest TTM". — **Paratypes**: with the same locality data, but between 6 and 21 September, 1973, 3 ♀♀. — Holotype deposited in the Landessammlungen für Naturkunde, Karlsruhe, paratypes in Karlsruhe and in the Hungarian Natural History Museum, Budapest.

Slides: Nos. 12.121, 12.124, 12.125, 12.127 (♀♀), gen. prep. Á. Mészár and A. Vojnits.



Figs. 2-4. Female genitalia of: 2 = *Eupithecia comparanda* sp. n., 3 = *producta* sp. n., 4 = *E. ingrata* sp. n.

3. *Eupithecia ingrata* sp. n. (Fig. 4)

(Derivation of specific name: ingratus = ungrateful)

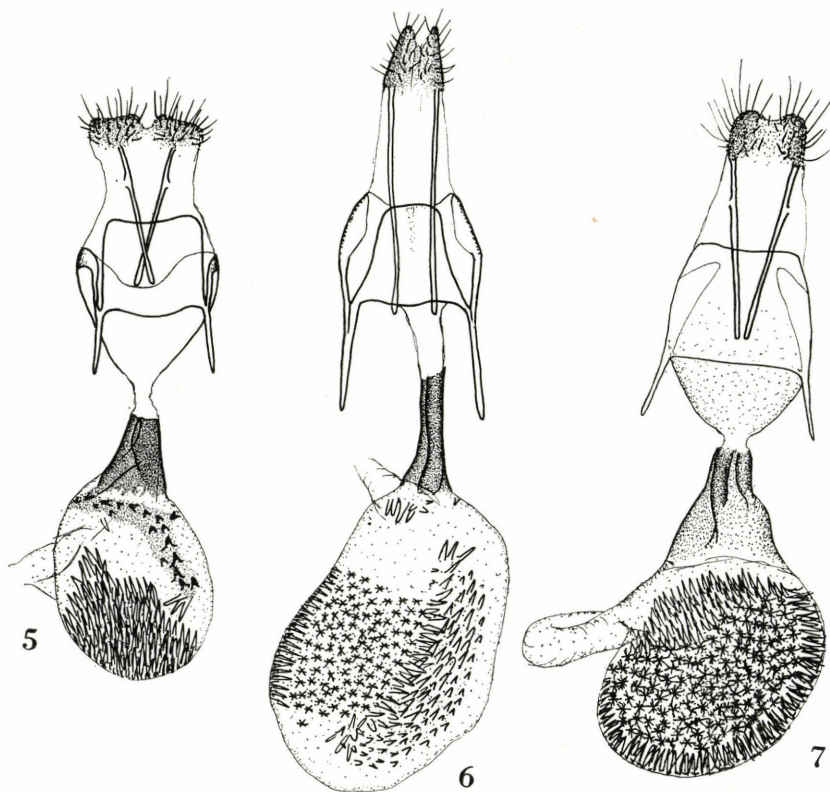
Diagnosis — Wing expanse 18 mm (based on the two known female specimens). Wings elongated, both fore and hind wings rather narrow and long. Basic colour of fore wing fuscous. Antemedian a narrow and highly convex line, postmedian a wide and yellowish stripe. Discal spot black, elongated, very near postmedian; discal spot connected by a black row of spots with costa and dorsum each. Terminal field with an obsolete submarginal stripe. Hind wing brownish yellow, discal spot hardly discernible. Underside of wings shiny yellowish brown, pattern obsolete, discal spots marked. Cilia short, striated brown and dirty yellow.

Genitalia. ♀: Bursa copulatrix widely angle-shaped, its two-thirds partially padded with robust chitinous spines. Tergite VIII a lying oblong. Anterior apophyses short and thick, posterior ones medium long. Papillae anales relatively large (Fig. 4). — ♂: unknown.

Biology — First stages and foodplant unknown. The two known specimens have been collected in July.

Distribution — Known from Pakistan. Locus typicus: Swat, Gabral valley, 2100 m.

Specific differences — Apparently referable to the alliance of *Eupithecia sinuosaria* Ev., but differs essentially both in the configuration of the female genitalia and in external morphology.



Figs. 5-7. Female genitalia of: 5 = *Eupithecia infecunda* sp. n., 6 = *E. likiangi* VOJNITS, 7 = *E. repetita* sp. n.

Holotype ♀: "W-Pakistan Swat, N v. Kalan Gabral-Tal, 2100 m 6.-9.-7.1969 G. Ebert leg." "Gen. prep. No. 12.092 ♀ Dr. A. Vojnits Budapest TTM". — **Paratype**: Swat, Kalan, 2000 m, 9.7.1969, 1 ♀. — Holotype deposited in the Landessammlungen für Naturkunde, Karlsruhe, paratype in the Hungarian Natural History Museum, Budapest.

Slides: Nos. 12.090, 12.092 (♀ ♀), gen. prep. Á. Mészár and A. Vojnits.

4. *Eupithecia infecunda* sp. n. (Fig. 5)

(Derivation of specific name: infecundus = unfruitful)

Diagnosis — Alar expanse of the single known female specimen 15 mm. Wings wide and short. Basic colour yellowish brown. Antemedian of fore wing brown, postmedian white, backed by a greyish shadow. Discal spot black. Terminal field wide, darker brown than rest of wing, with a submarginal stripe composed of minute yellow lunules. Hind wing with transverse stripes yellowish white, discal spot black. Underside of wings brownish yellow, pattern elements conspicuous. Cilia short, densely striated brown and yellowish brown.

Genitalia. ♀: Bursa copulatrix oval, anteriorly densely padded with long chitinous spines, medially with a chitinous band decurrent posteriorad, bearing short and wide spines. Cervical part heavily sclerotized. Antrum very wide, sclerotized. Both anterior and posterior apophyses short. Papillae anales wide, flattened (Fig. 5). — ♂ unknown.

Biology — First stages and foodplant unknown. The holotype specimen was collected in July.

Distribution — Known from Pakistan. Locus typicus: Swat, Kalam, 2000 m.

Specific differences — With respect to external morphology, the new species displays features characteristic partly of *E. inturbata* HBN., partly of *E. laquearia* Hs. The female genitalia differ essentially from those of both the above species.

Holotype ♀: "W-Pakistan Swat, Kalam 2000 m, 9.7.1969 G. Ebert leg." "Gen. prep. No. 12.091 ♀ Dr. A. Vojnits Budapest TTM". Deposited in the Landessammlungen für Naturkunde, Karlsruhe.

Slide: No. 12.091 (♀), gen. prep. A. Vojnits.

5. *Eupithecia likiangi* VOJNITS, 1976 (Fig. 6) (Acta Zool. Hung., 22: 203–204, Figs. 1:E, 2:D) — A fine female specimen, representing the species described from Likiang, China, was found in the material from North India. The specimen has been captured in the autumn (September) which also agrees with most of the data known so far. I found no external morphological or anatomic differences as compared to the Chinese exemplars. A more detailed illustration of the female genitalia is now submitted (Fig. 6).

Examined material: 1 ♀ North India, Bhim valley (Naini valley), 1450 m, 9.9.1973, at light, lge. S. Richter.

Slide: No. 12.123 (♀), gen. prep. A. Vojnits.

6. *Eupithecia repetita* sp. n. (Figs. 7–8)

(Derivation of specific name: repetitus = repeated)

Diagnosis — Average alar expanse of male fore wings 17.5 mm, extreme values 17 and 19 mm (based on 5 specimens); of female fore wings 18.5 mm, extreme values 17.5 mm and 21 mm. Wings wide. Basic colour of fore wings fuscous, median field the darkest. Antemedian a wide, double, greyish yellow stripe, postmedian more yellowish. Median field with a yellowish band in its median line, its lower half with a long brown shadow. Discal spot large, black, long, marked. Terminal field with a yellowish submarginal. Hind wing greyish white, irrorated yellow and brown. Transverse stripes fuscous to dark grey, discal spot minute, oval, black. Underside of wings greyish yellow, pattern elements extraordinarily conspicuous. Cilia short, striated grey and greyish yellow.

Genitalia. ♂: Male genitalia very characteristic: valva very wide, angular; uncus much elongated; saccus wide; aedoeagus cylindrical with elongate chitinous formations. Sternite VIII squat, short, with short and wide arms; basally incised (Fig. 8); — ♀: Bursa copulatrix pyriform, about three-fourths padded with chitinous spines, its posterior quarter heavily sclerotized. Anterior apophyses short, posterior ones medium long. Papillae anales small (Fig. 7).

Biology — First stages and foodplant unknown. All known specimens have been collected in July.

Distribution — Known from Western Pakistan. Locus typicus: Swat, Kalam, 2000 m.

Specific differences — Externally, the new species resembles the greyish exemplars of *Catarina suboxydata* STGR., but differs essentially by the very light hind wings. The configuration of the genitalia is utterly different; those of the males approach *Eupithecia exquisita* VOJNITS, but this latter differs again externally.

Holotype ♂: "W-Pakistan Swat, Kalam 2000 m 9.7.1969 G. Ebert leg." "Gen. prep. No. 12.105 ♂ Dr. A. Vojnits Budapest TTM". — **Paratypes**: with the same data: 2 ♂♂, 3 ♀♀; Swat, north of Kalam, Gabral valley, 2100 m, 6-9.7.1969; 2 ♂♂, 7 ♀♀ leg. Ebert. — Holotype deposited in the Landessammlungen für Naturkunde, Karlsruhe, paratypes in Karlsruhe and the Hungarian Natural History Museum, Budapest.

Slides: Nos. 12.104, 12.105, 12.113, 12.114, 12.116, (♂♂); 12.106, 12.107, 12.108, 12.109, 12.110, 12.111, 12.112, 12.115, 12.117, 12.118 (♀♀), gen. prep. A. Mészár and A. Vojnits.

7. *Eupithecia invicta* sp. n. (Fig. 9)

(Derivation of specific name: invictus = heroic)

Diagnosis — Alar expanse of the single known holotype male 15 mm. Wings medium wide. Ante- and postmedians yellowish. Basic colour of fore wing yellowish brown. Discal spot dark brown, marked, elongated. Hind wing dirty yellowish. Discal spot rounded. Transverse stripes fuscous, obsolescent. Underside of wings yellowish with well discernible brown transverse stripes and discal spots. Cilia short, striated yellowish brown and brown.

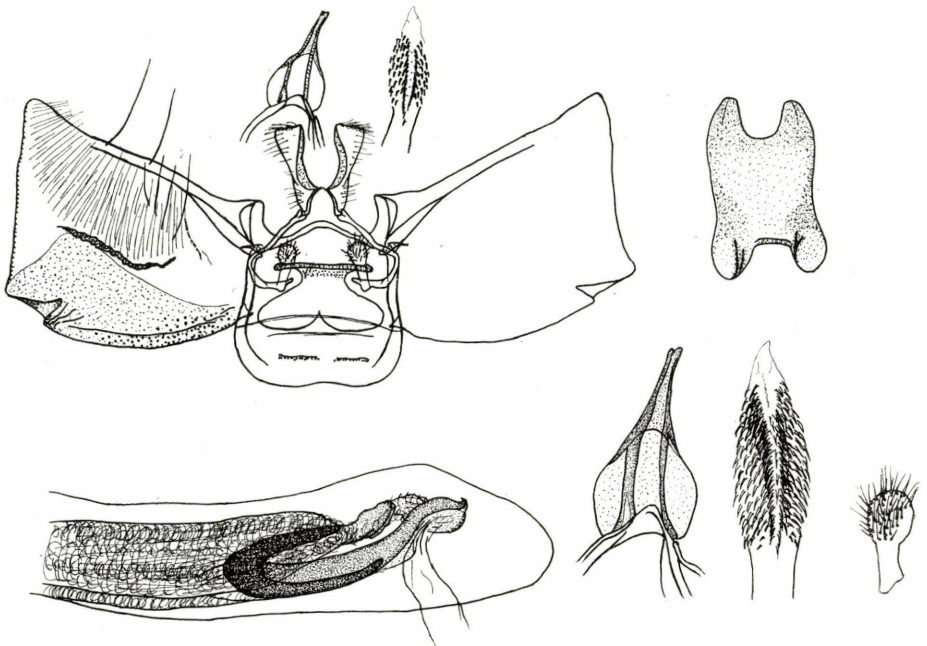


Fig. 8. Male genitalia and sternite VIII of *Eupithecia repetita* sp. n.

Genitalia. ♂: Uncus long, robust. Valvae very long, dorsum straight, ventrum with a projection. Apex truncate. Saccus wide. Aedoeagus short, thick, cylindrical, with an arcuate, falciform and several irregularly shaped chitinous formations. Base of sternite VIII. weakly excised, terminally heavily sclerotized (Fig. 9); — ♀: unknown.

Biology — First stages and foodplant unknown. The holotype was collected in September.

Distribution — North India. Locus typicus: Kumaon, Bhim valley.

Specific differences — Externally the new species is relegable to the *Eupithecia selinata* group, but the male genitalia differs considerably from those of its near allies.

Holotype ♂: "Nord-Indien Kumaon Bhimtal (Noinital), 1450 m. 23.9.1972, Lichtfang leg. S. Richter" "Gen. prep. No. 12.126 ♂ Dr. A. Vojnits Budapest TTM". — Holotype deposited in the Landessammlungen für Naturkunde, Karlsruhe.

Slide: No. 12.126 (♂), gen. prep. A. Vojnits.

II. THE OCCURRENCE OF *EUPITHECIA RECENS* DIETZE AND *E. REPENTINA* VOJNITS ET DE LAEVER IN JAPAN

Eupithecia recens DIETZE, 1903, D. ent. Z. Iris, 16:349–351, pl. 3:26.

Eupithecia repentina VOJNITS, DE LAEVER 1978, Acta Zool. Hung., 24: 237–238, figs. 15, 17.

INOUE (1980) discussed in detail original description of *Eupithecia recens* DIETZE as well as that given by PROUT. On the basis of the investigated population in Japan he also characterized the configuration of the genitalia and also published their photographs. In his interpretation of the species he stated that our recens data from China (VOJNITS et DE LAEVER 1978) are based on erroneous identifications, further that *Eupithecia repentina* VOJNITS et DE LAEVER, described in the same paper, is a junior synonym of recens DIETZE.

The fact that we have examined type-specimens in our study must have escaped INOUE's attention. We have namely stated as follows: "We have studied the type-specimen deposited in the Humboldt Museum, Berlin («*Eupithecia recens* Dietze ♂ Sidemi Type» «Geom: 1950–593 A Humboldt Mus. u. Univ. Berlin»), as well as our own slides". Despite the fact that some details may vary, both the male and the female genitalia are highly characteristic. I should like to call attention again to the spiniform ventral appendage on the valva of the male genitalia, a process considerably more robust than that of *E. repentina* VOJNITS et DE LAEVER or that of the species which INOUE presents as *E. recens* DIETZE. The aedoeagi and especially sternites VIII are also highly different (Figs. 10–11). The

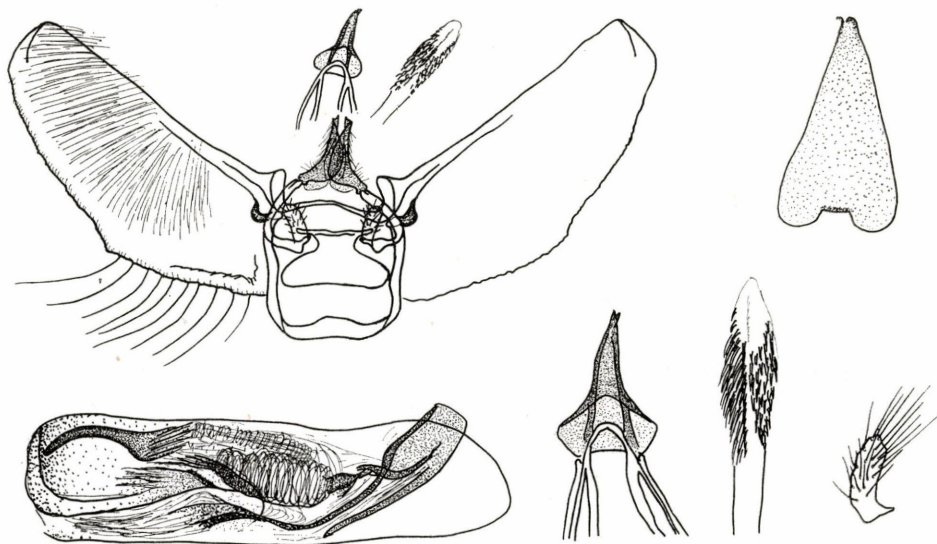


Fig. 9. Male genitalia and sternite VIII of *Eupithecia invicta* sp. n.

female genitalia are large, in the case of specimens of equal size those of *recens* are twice to thrice bigger than those of *repentina*. The female genitalia of *E. repentina* agrees with the figure published as *E. recens* DIETZE by INOUE (Figs. 12-13). All these again agree with the photographs given in DE LAEVEER's (1960) work in spite of the fact of their small size and questionable quality.

Accordingly, INOUE's figures cannot represent *Eupithecia recens* DIETZE. On the basis of the photographs of the imago and the male and female genitalia, we are dealing with Japanese specimens of *E. repentina* VOJNITS et DE LAEVEER. It can therefore be stated that 1. we have no datum on the basis of INOUE's work (1980) on the occurrence of *Eupithecia recens* DIETZE in Japan; 2. The male and female genitalia of *E. recens* DIETZE were correctly illustrated by DE LAEVEER (1960) and VOJNITS et DE LAEVEER (1978); more detailed figures of the genitalia are submitted in the present paper; 3. *Eupithecia repentina* VOJNITS et DE LAEVEER is a bona species, new for the fauna of Japan, because the data given for "*recens*" by INOUE refer to the above species. New, detailed figures are hereby given.

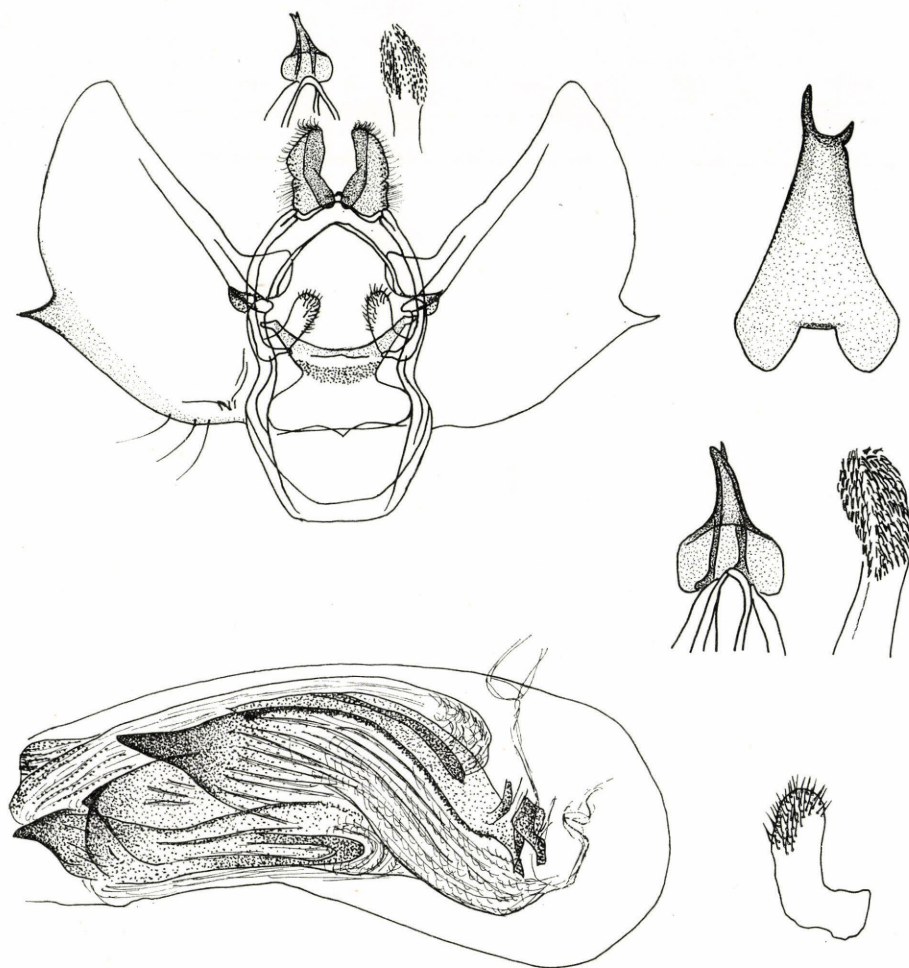


Fig. 10. Male genitalia and sternite VIII of *Eupithecia recens* DIETZE

III. THE PROBLEM OF *EUPITHECIA INVISA* BUTLER

*Eupithecia invis*a BUTLER, 1878, Ann. Mag. Nat. Hist., (5) 1:444; BUTLER, 1879, III. Het. Coll. Brit. Mus., 3:51, pl. 53:10; LEECH, 1897, Ann. Mag. Nat. Hist. (6) 20:68; PROUT, 1914, in SEITZ, Macrolepidoptera 4:284; INOUE, 1956, Check List Lep. Jap., 3:291; VOJNITS et DE LAEVER, 1978, Acta Zool. Hung., 24: 225-252 (231, fig. 10: erroneously "*invis*a DIETZE").

*Tephroclystia invis*a: MATSUMURA, 1905, Cat. Ins. Jap., 1:137.

*Eupithecia pimpinellata invis*a: INOUE, 1977, Bull. Fac. domestic. Sci. Otsuma Woman's Univ., 13:277.

? *Eupithecia virgaureata*: PÜNGELER, 1898, D. ent. Z. Iris, 10: 371; WILEMAN, 1911, Trans. ent. Doc. Lon., 1911:330.

Tephroclystia virgaureata: MATSUMURA, 1905, Cat. Ins. Jap., 1:136.

Eupithecia virgaureata: PROUT, 1914 in SEITZ, Macrolepidoptera, 4:294.

*Eupithecia virgaureata invis*a: INOUE, 1980, Revision of the Genus *Eupithecia* of Japan, Part 2 (Lepidoptera: Goemetridae), Bull. Fac. domestic. Sci., Otsuma Woman's Univ., 16:153-213, 193-198 Figs. 49: O, 50 :E, 54: B, C, 56: E, 59: E.

INOUE (1980) has recently discussed the problem in detail. He brought forth the divers descriptions and stated that the Japanese populations of his study stand nearest to the species *virgaureata* DBLD., indeed that they represent its Far East subspecies. In my opinion—with respect to the great variability of *virgaureata* in Europe, the minute difference in tinge (discernible only in part of the exemplars!) beside the agreement of the genitalia does not seem to justify the subspecific treatment of the Japanese specimens. INOUE himself characterized the investigated exemplars as follows: "Japanese populations are extremely variable in size, colour and maculation according to season of appearance, and usually northern and southern specimens show minor geographic variation. From the European nominate race it is easily separable by less brownish coloration of wings. The genitalia are identical between the nominate and Japanese races".

INOUE mentions that though the genitalia (♂!) of the holotype of *invis*a BUTLER (BMNH Geom, Slide 3769) stand nearest to those of *E. pimpinellata* HÜBNER, FLETCHER detected that the actual specimen is a female! Therefore earlier to the making of the slide a foreign abdomen had been glued to the typespecimen and the slide was made

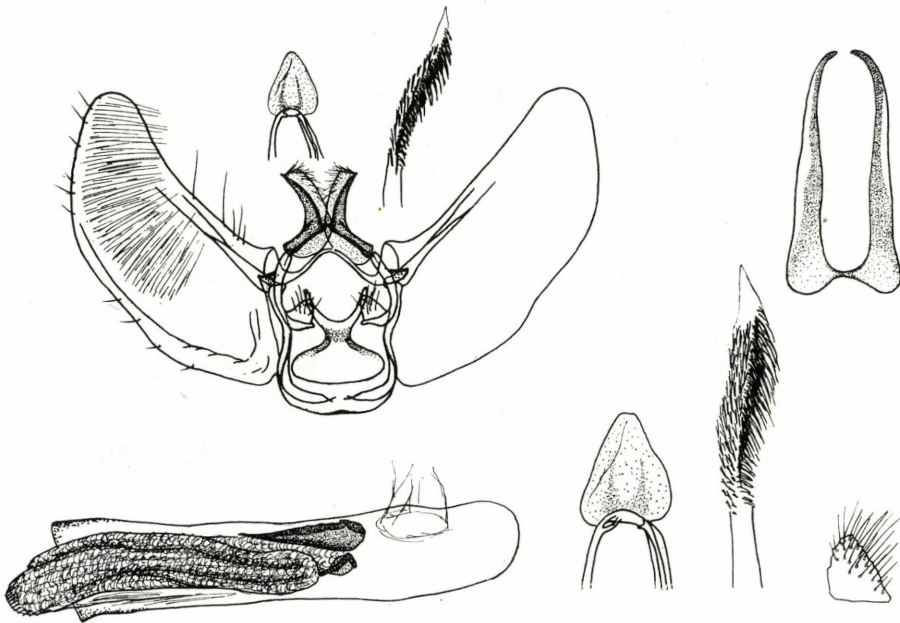


Fig. 11. Male genitalia and sternite VIII of *Eupithecia repentina* VOJNITS et DE LAEVER

of this foreign organ. This precludes not only the possibility of relegating *invisa* BUTLER with any reliability in the vicinity of *pimpinellata* HÜBNER, but also any reasonable interpretation of — pending the availability of new data — the specificity of *invisa* BUTLER.

Accordingly, the following statements can now be made:

1. *Eupithecia virgaureata invisata* BUTLER cannot be considered a "status. nov." (INOUE 1980), because the interpretation of *invisa* at the subspecific level has already been made: *Eupithecia pimpinellata invisata* BUTLER (INOUE 1977). The former name should have been designated as "comb. n.";

2. On the basis of the external morphological and the anatomical features, the Japanese populations studied by INOUE (1980) represent merely the nominate subspecies of *Eupithecia virgaureata* DOUBLEDAY;

3. *Eupithecia invisata* BUTLER, 1878, is to be considered a species inquirerenda until the availability of decisive new data;

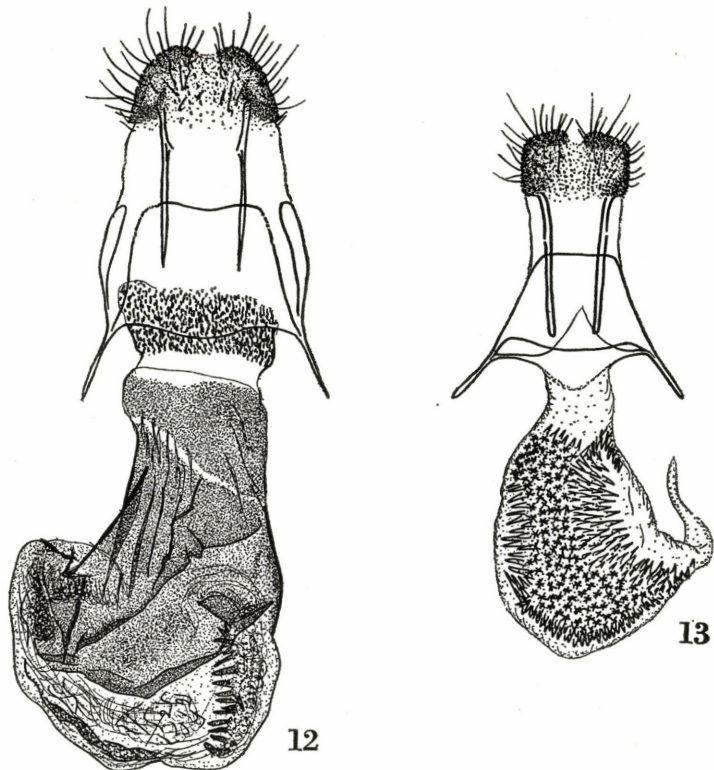
4. The revision concerning the occurrence of *invisa* BUTLER in North Korea (VOJNITS & DE LAEYER 1978) can be made only subsequent to the solution of the contradictory interpretations concerning, that is, in cognizance of the true specificity of *invisa* BUTLER.

IV. NEW DATA TO THE "EUPITHECIA BOHATSCHI" GROUP

1. *Eupithecia bohatschi* STAUDINGER

Eupithecia bohatschi STAUDINGER, 1897, D. ent. Z. Iris, 10: 111-112, Pl. 3: 73.

Eupithecia tuvunica VIIDALEPP, 1976, Insects of Mongolia, 4: 392-396, Figs. 41-47, syn. n.



Figs. 12-13. Female genitalia of: 12 = *Eupithecia recens* DIETZE, 13 = *E. repentina* VOJNITS et De LAEYER

The species constituting the group rather resemble one another as regards external morphology, nor are the differences in the genital structure conspicuous in every case. All of this contributed to many cases of identification problems. VIIDALEPP, Tartu, has very kindly sent me 7 paratypes (5 males and 2 females) of his *Eupithecia tuvinica* for revision. Every one of the specimens agreed, both externally and anatomically, with the species *Eupithecia bohatschi* STAUDINGER. This result was further corroborated by a comparison with two *bohatschi* exemplars, deriving from Chabarovsk, Ussuri, made kindly available by MR. J. FLETCHER, British Museum (Nat. Hist.). The slight differences in tinge ("*tuvinica*" is generally yellower) and size (there are many small specimens among the "*tuvinica*" exemplars) cannot be considered sufficient to distinguish it even from the nominate subspecies of *bohatschi*, the more so as specimens of *bohatschi* populations, studied on other occasions, have also varied to this extent.

The male genitalia of *bohatschi* are characterized by a flat uncus, elongated valvae, a straight or hardly concave saccus, a relatively small aedeagus (slightly incrassate on one end) containing a minute spiniform and a small and irregularly shaped chitinous formations, as well as the very long lateral arms of sternite VIII (Fig. 14). The male genitalia of the paratypes of *E. tuvinica* VIIDALEPP agree in every detail; the figures given in VIIDALEPP'S (1976) paper are also conforming (with some smaller deviations) with this picture, of course, they do not represent anything but the genitalia of *bohatschi*. The female apparatus is also characteristic. The bursa copulatrix is pyriform, medially with two opposed chitinous fields, and the narrower posterior part another, anelliform, chitinous field pads the bur-sal wall; however, this ring is not of uniform width (Fig. 15). The female genitalia of the paratypes of *E. tuvinica* VIIDALEPP show the same details. In VIIDALEPP'S figure (1976), the bursa copulatrix is much too elongated, the chitinous spines too small and rather sparsely arranged.

Examined material — In addition to the material published previously (VOJNITS 1976): 1. Tuva, Ak-Dovurak, Barum, 3–6.8.1972, at light, leg. Ruben et Viidalepp, 5 ♂♂, 1 ♀; Tuva, Kozol, Kua-Hem, 7. 1972, at light, leg. Ruben and Viidalepp, 1 ♀ = all paratypes of *E. tuvinica* VPP. — 2. Chabarovsk, Ussuri railway, 20. 6. 1911, 20. 7. 1970, leg. E. Borsow, 2 ♀♀.

Slides: Nos. 11.105, 11.116, 11.117, 11.118, 11.119, 11.306, 11.307 (♂♂); 11.114, 11.115 (♀♀), gen. prep. Á. Mészár and A. Vojnits.

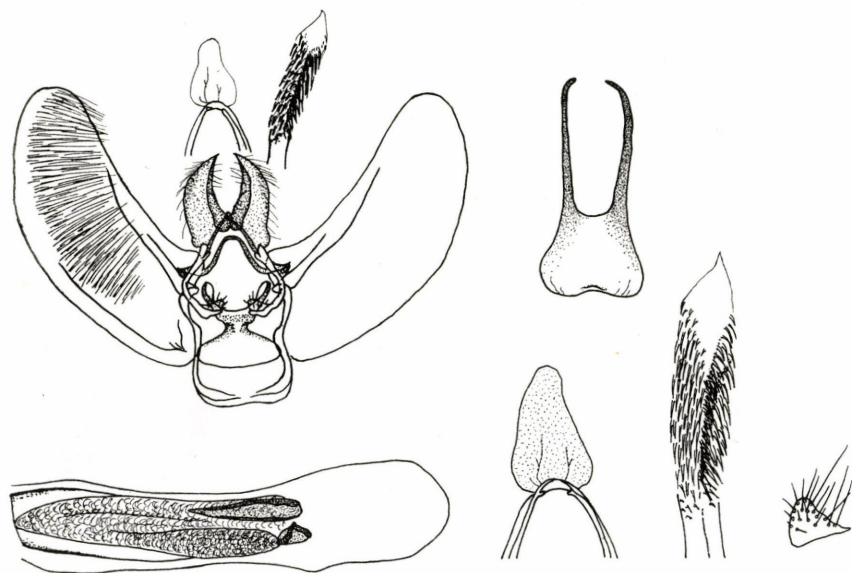
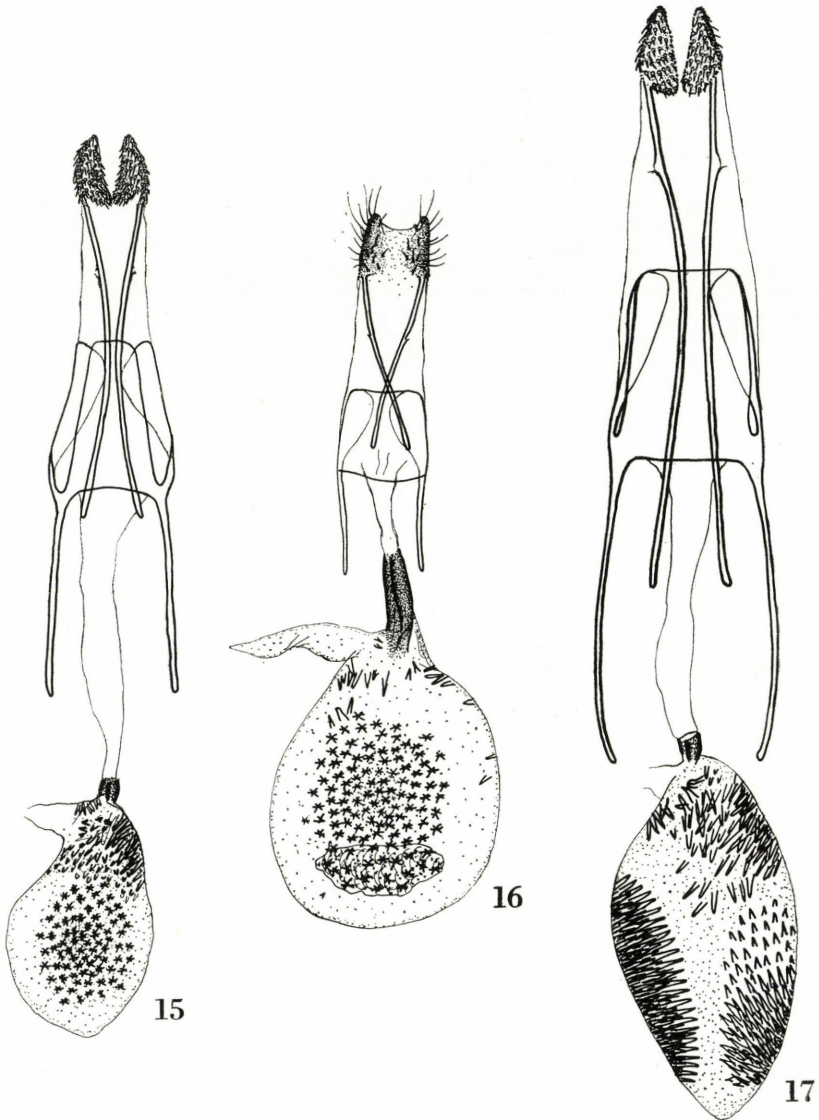


Fig. 14. Male genitalia and sternite VIII of *Eupithecia bohatschi* STAUDINGER

2. *Eupithecia viidaleppi* sp. n. (Figs. 16, 18)

Diagnosis — Average alar expanse of males 15.5 mm, extreme values 14 and 16.5 mm (based on 8 specimens); that of the two female exemplars 16 and 17 mm. Wings wide. Basic colour of fore wings yellowish brown. Antemedian whitish, doubled, postmedian a wide whitish band. Median field broad, its two-thirds towards base white, Discal spot black, minute or conspicuous. Hind wing white. Transverse stripes fuscous, of varying width. Discal spot minute. Underside of wings with a sericeous sheen, all pattern elements well discernible. Cilia medium long, fuscous, shiny.



Figs. 15-17. Female genitalia of: 15 = *Eupithecia bohatschi* STAUDINGER, 16 = *E. viidaleppi* sp. n., 17 = *E. sachalini* sp. n.

Genitalia. ♂: Uncus flat, wide, conspicuously incised. Valvae wide and unevenly arcuate. Saccus explicitly concave. Aedeagus cylindrical and comparatively short, at one end conspicuously, clavately thickened; internally with a thicker chitinous spine and a small chitinous formation of irregular shape. Sternite VIII wide, its arms thick, their length not exceeding half of entire length of sternum (Fig. 18). — ♀: Bursa copulatrix resembling a lemon; anteriorly padded with chitinous spines, posteriorly with only a few chitinous spines. Cervical part elongately sclerotized. Tergite VIII quadratic, both anterior and posterior apophyses rather long and robust. Papillae anales long and heavily chitinized (Fig. 16).

Biology — First stages and foodplant unknown. All known specimens have been collected in July and August.

Distribution — Discovered in the Far East. Locus typicus: Lazo, Benevskoie, Ussuri-

Specific differences — As regards external morphology, the new species resembles *Eupithecia likiangi* VOJNITS, 1976, but its wings are wider and the apex of the fore wing rounded. In *E. bohatschi* STAUDINGER, 1897, the discal spots are equally conspicuous on both the fore and hind wings, and the location of the white field on the fore wing is different. By the configuration of the genitalia, the new species is easily separated from both of the above species and from several other species of the *bohatschi* group (VOJNITS 1976).

Holotype ♂: "S-Ussuri 17.7.1976 Lazo rj., Benevskoje Viidalepp, Metsaviir Ruben L" "Eupithecia bohatschi Stgr. det. Viidalepp 1977" "Gen. prep. No. 11.090 ♂ Dr A. Vojnits Á. Mészár Budapest TTM". — **Paratypes**: 1. with data as the holotype, 1 ♂, 1 ♀. 2. S-Ussuri, Partizanski, Autsani, Ulemjooks, 14-16.7. 1976, leg. Metsaviir, Ruben, Vasjurin and Viidalepp, 1 ♂. 3. S-Ussuri, Kedrovaja Pad, Sidimi, 27. 7.-4. 8. 1976, leg. Kononenko, Metsaviir, Ruben and Viidalepp, 1 ♂. 4. Ussuri Basin, Gornoi, 14-27.7.1973, leg. Kullman, Tiivel and Viidalepp, 1 ♀. — All labelled as "Eupithecia bohatschi Stgr.", det. Viidalepp. Holotype and paratypes deposited in the Hungarian Natural History Museum, Budapest.

Slides: Nos. 11.087, 11.088, 11.089, 11.090, 11.122, 11.124, 11.125, 11.316 (♂♂); 11.086, 11.315 (♀♀), gen. prep. Á. Mészár and A. Vojnits.

Remarks — 1. A female specimen derives from the island Sachalin; its genitalia slightly differ from those collected on the Asiatic mainland yet not to the extent of justifying

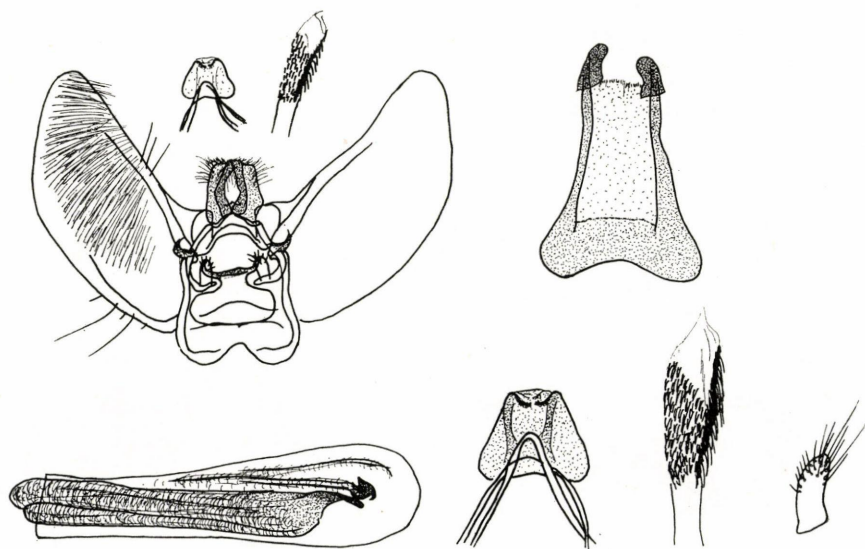


Fig. 18. Male genitalia and sternite VIII of *Eupithecia viidaleppi* sp. n.

a taxonomic separation.—2. In the elaboration of the very difficult group, VIIDALEPP (1976) made some mistakes of interpretation. With the exception of one specimen, all of his insects identified as *bohatschi*—at least those he sent to me—represent a hitherto undescribed species (= *viidaleppi* sp. n.); as for the exception, see the treatment of the next species. In his work, the figures purporting to represent *bohatschi* are referable to the new species (the males); nor is the figure of the male genitalia exact (and not even resembling those of *bohatschi*). And the figure displaying the female bursa copulatrix must have been made on the basis of an exemplar which, though standing near to *bohatschi*, is not this species nor the new one—or the figure represents an aberrative specimen of *bohatschi* or is fundamentally erroneous.

I dedicate the new species to J. VIIDALEPP (Tartu, Estonia), excellent worker in the Geometridae, and in acknowledgement of the priceless material made available for study.

3. *Eupithecia sachalini* sp. n. (Fig. 17, 19)

Diagnosis. A large-sized species within the *bohatschi* group. Alar expanse of the one known pair of specimens 19 mm. Wings wide, apex of fore wing rounded. Basic colour of fore wing brown with a violet sheen. Ante- and postmedian doubled, whitish stripes. Median section of basal field and anterior part of median field white. Discal spot black, marked. Terminal field dark, with a sharp zigzaggy submarginal line. Hind wing greyish white, transverse stripes densely arranged, grey, discal spot black. Underside of wings grey, pattern elements extraordinarily marked. Cilia medium long, shiny, striated yellowish grey and grey.

Genitalia. ♂: Uncus flat, valvae elongated saccus rounded. Aedoeagus thin, cylindrical, with a chitinous spine and another chitinous formation of irregular shape. Sternite VIII incised to its

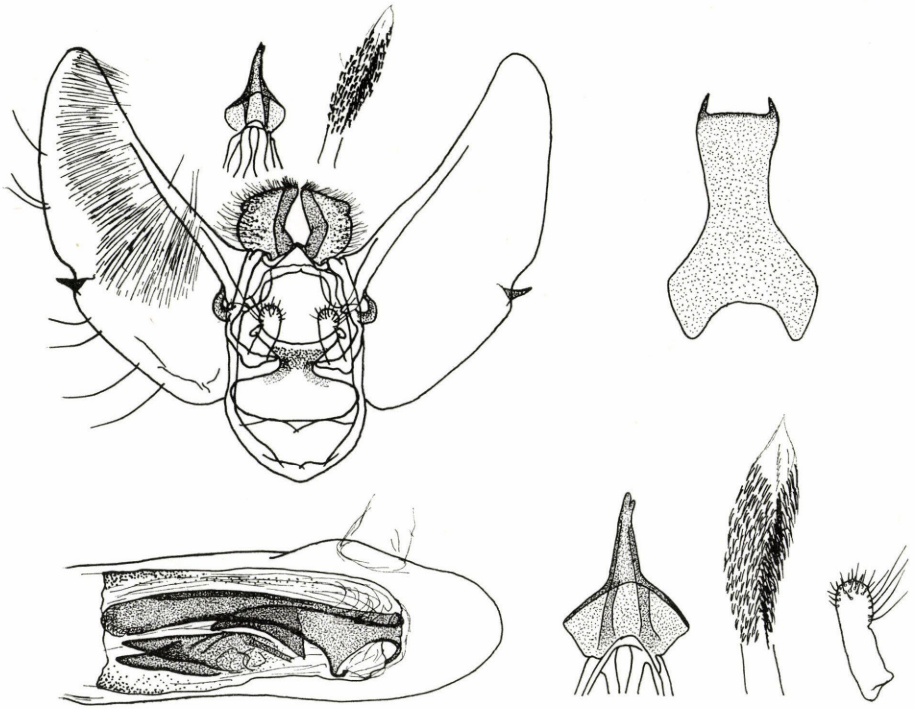


Fig. 19. Male genitalia and sternite VIII of *Eupithecia sachalini* sp. n.

base, the arms very long (Fig. 19). — ♀: bursa copulatrix elongate, two oppositely situated fields of robust chitinous spines, those in posterior part of bursa of identical size. Only a short section of cervical part of bursa sclerotized. Sternite VIII an upright oblong. Anterior and posterior apophyses very long. Papillae anales elongate, heavily sclerotized (Fig. 17).

Biology — First stages and foodplant unknown. Both known specimens have been collected in July.

Distribution — Known from the Far East. Locus typicus: Tomovsk, Sachalin.

Specific differences — The new species stands nearest to *E. bohatschi* STAUDINGER, 1987, differing externally mainly by the more detailed and vivid pattern. The male genitalia are more heavily sclerotized, the valvae wider, the arms of sternite VIII larger. In the female genitalia, the location of the patches of chitinous spines and the shape of the bursa copulatrix are different, and the apophyses are also longer.

Holotype ♂: "Sachalin Tomovsk, 12–14. 7. 1975, leg. J. Viidalepp" "Eupithecia bohatschi Stgr. det. Viidalepp 1977" "Gen prep. No. 11 222 ♂ Dr. A. Vojnits, Budapest TTM". — **Paratype**: Chabarowsk, airport, 13. 7. 1970, 1 ♀.

Slides: Nos. 11.222 (♂), 11.085 (♀), gen. prep. Á. Mészár and A. Vojnits.

Remarks — As already stated above, all specimens identified as *E. bohatschi* by VIIDALEPP, and later sent to me for study, proved to represent a new species (= *viidaleppi* sp. n.), with one exception. This latter specimen became the holotype of *Eupithecia sachalini* sp. n. Irrespectively of specific assignment, I should like to emphasize that the male specimens of the alleged series of *bohatschi* could be segregated, both as to external morphological features and especially the configuration of the genitalia, into two sharply different forms.

V. EUPITHECIA FENNOSCANDICA KNABEN FROM MONGOLIA

Eupithecia fennoscandica KNABEN, 1949, Ent. Tidskrift, 70 (1–2): 77.81, Figs. A-E, A-H, Pl. 1.

Eupithecia undata FREYER, 1858, N. Beitr. z. Schmetterlingskunde, 4: 54.

In the second part of my papers discussing the *Eupithecia* species of Mongolia (VOJNITS 1975), I treated *E. undata* FREYER under serial number 21. VIIDALEPP suggested (1977) that this must be a case of misidentification. On the basis of VIIDALEPP's work I have again examined the specimen and can now state that my earlier standpoint was wholly erroneous ("the genital slide assigns it unequivocally to this species"). The animal in question represents *E. fennoscandica* KNABEN, the species shown also by VIIDALEPP from Mongolia. The species *E. undata* FREYER is to be deleted from the Mongolian *Eupithecia* fauna, and to be substituted by *E. fennoscandica* KNABEN with the following (unchanged) data (male genitalia represented by Fig. 20):

Examined material — Archangaj aimak: Changaj Gebirge, zwischen Somon Ichtamir and Somon Culuut, 20 km W von Ichtamir, 2150 m, 19. VII. 1966 (Nr. 716), 1 ♂, Exp. Dr. Z. KASZAB.

Slide: No. 10.290 (♂), gen. prep. A. Vojnits.

* * *

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References

- BUTLER, A. G. (1878): Descriptions of new species of Heterocera from Japan. — *Ann. Mag. nat. Hist.*, (5) 1: 444–445.
- BUTLER, A. G. (1879): Descriptions of new species of Heterocera from Japan. — *Ann. Mag. nat. Hist.*, (5) 4: 442–443.
- BUTLER, A. G. (1879): Illustrations of typical specimens of Lepidoptera Heterocera in the Collection of the British Museum. — Part III: 51–52.
- CHRISTOPH, H. (1881): Neue Lepidopteren des Amurgebiets. — *Bull. Soc. nat. Mosc.*, 55: 117–121.
- DIETZE, K. (1903): Beiträge zur Kenntnis der Eupitheciiden. — *D. ent. Z. Iris*, 16: 331–387.
- DIETZE, K. (1906): Beiträge zur Kenntnis der Eupitheciiden. — *D. ent. Z. Iris*, 19: 55–67.
- DIETZE, K. (1908): Beiträge zur Kenntnis der Eupitheciiden. — *D. ent. Z. Iris*, 21: 153–201.
- DIETZE, K. (1910): Biologie der Eupitheciiden. — Erster Teil: Abbildungen.
- DIETZE, K. (1911): Biologie der Eupitheciiden. — Zweiter Teil: Text.
- HAMPSON, G. F. (1895): The Fauna of British India, including Ceylon and Burma. — *Moths* Vol. 3: 398–403.
- HAMPSON, G. F. (1896): The Fauna of British India, including Ceylon and Burma. — *Moths* Vol. 4: 559–560.
- INOUE, H. (1977): Catalogue of the Geometridae of Japan. — *Bull. Fac. domestic Sci., Otsuma Woman's Univ.*, 13: 274–278, 320–321.
- INOUE, H. (1979): Revision of the genus *Eupithecia* of Japan, Part 1. — *Bull. Fac. domestic Sci., Otsuma Woman's Univ.*, 15: 157–224.
- INOUE, H. (1980): Revision of the genus *Eupithecia* of Japan, Part 2. — *Bull. Fac. domestic Sci., Otsuma Woman's Univ.*, 16: 153–213.
- KNABEN, N. (1949): *Eupithecia fennoscandica* sp. n. (Lepid., Geometridae). — *Ent. Tidskrift*, 70 (1–2): 77–81.
- LAEVER, E. DE (1960): Études sur le genre *Eupithecia* Curtis. — *Bonn. zool. Beitr.*, 11: 114–123.
- LEECH, J. H. (1897): On Lepidoptera Heterocera from China, Japan and Corea. Part. II. — *Ann. Mag. nat. Hist.*, 20 (6): 65–71.
- PETERSEN, W. (1909): Ein Beitrag zur Kenntnis der Gattung *Eupithecia* Curt. Vergleichende Untersuchung der Generationsorgane. — *D. ent. Z. Iris*, 22: 203–314.
- PROUT, L. B. (1914–1915): In SEITZ, *Macrolepidoptera of the World*. — Vol. 4: 274–297.
- PROUT, L. B. (1938): In SEITZ, *Macrolepidoptera of the World*. — Supplement Vol. 4: 182–210.
- STAUDINGER, O (1897): Die Geometriden des Amurgebiets. — *D. ent. Z. Iris*, 10: 108–121.

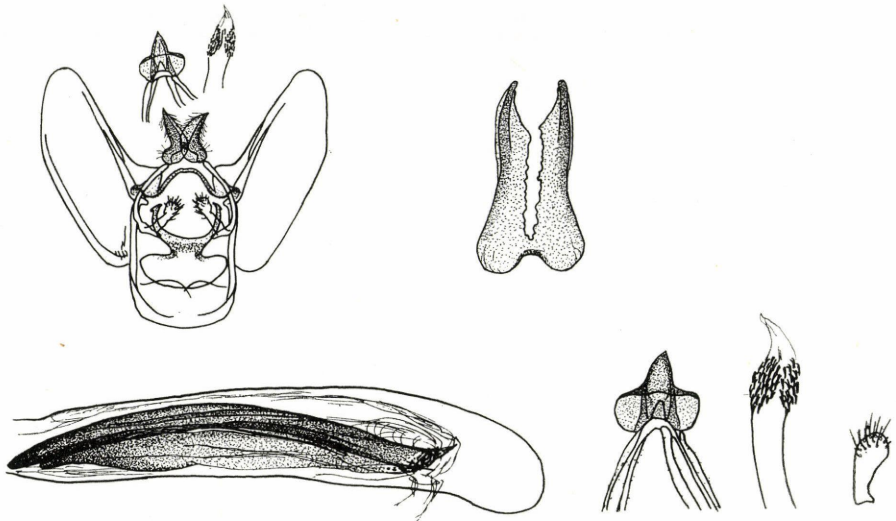


Fig. 20. Male genitalia and sternite VIII of *Eupithecia fennoscandica* KNABEN

- SWINHOE, C. (1892): New species of Heterocera from Khasia Hills. Part II. — *Trans. ent. Soc. Lond.*, 1892: 1-2.
- SWINHOE, C. (1895): New species of Indian Epiplemidæ, Geometridæ, Thyrididiæ, and Pyralidæ. — *Ann. Mag. nat. Hist.*, **16** (6): 295-296.
- VIIDALEPP, J. (1975): On the fauna of geometrid moths of the Mongolian People's Republic. — *Insects of Mongolia*, **3**: 462-470.
- VIIDALEPP, J. (1976): New genera and species of geometrid moths from Southern Siberia and Mongolia. — *Insects of Mongolia*, **4**: 385-396.
- VOJNITS, A. M. (1975): Geometridæ: Eupithecini II. (Lepidoptera). — *Acta Zool. Hung.*, **21** (3-4): 447-453.
- VOJNITS, A. M. (1976): New Species of the Eupithecia bohatschi Group from China (Lepidoptera: Geometridæ). — *Acta Zool. Hung.*, **22** (1-2): 197-211.
- VOJNITS, A. M. (1977): Geometridæ Eupithecini III. (Lepidoptera). — *Acta Zool. Hung.*, **23** (3-4): 461-485.
- VOJNITS, A. M. (1979): New and rare Eupithecia species from China (Lepidoptera: Geometridæ). — *Acta Zool. Hung.*, **25** (1-2): 193-211.
- VOJNITS, A. M. (1979): New and rare Eupithecia species from China (Lepidoptera: Geometridæ). II. — *Acta Zool. Hung.*, **25** (3-4): 425-439.
- VOJNITS, A. M. & LAEVER, E. DE (1978): Eupithecini from Korea and China (Lepidoptera). — *Acta Zool. Hung.*, **24** (1-2): 225-252.

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