

Mayflies (Ephemeroptera) new to the fauna of Czechoslovakia found in 1972—1977

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Abstract. During the past six years more than 600 localities in the basins of the rivers Elbe, Oder, Vistula and Danube have been investigated. At some of these localities twelve species hitherto unknown from Czechoslovakia were found: *Metreletus goethgebuerei* (LÉST.) (Siphonuridae); *Centroptilum pulchrum* ETN., *Baetis pentaplebedes* UJHELYI, *B. sinicus* (BOG.), *B. vardarensis* IKONOMOV, *Baetopus tenellus* (ALB.), *Procloeon ornatum* TSHERN., *Pseudocloeon inexpectatum* TSHERN. (Baetidae); *Ametropus eatoni* BROD. (Ametropodidae); *Oligoneuriella mikulskii* SOWA (Oligoneuriidae); *Brachycercus minutus* TSHERN., *Caenis rivulorum* ETN. (Caenidae). Seven further species described or redescribed after 1970 (not included in "Fauna ČSSR") were found: *Baetis calcaratus* KEFFERMÜLL., *B. gemellus* ETN., *B. melanonyx* (PICT.), *B. tricolor* TSHERN. (Baetidae); *Ecdyonurus starmachi* SOWA, *Rhithrogena ferruginea* NAVÁS; *R. iridina* (KOL.) (Heptageniidae). The known distribution of all species mentioned is summarized and localities in Czechoslovakia are listed. The zoogeographical relationships are discussed. Life cycle and bionomy of extremely rare or insufficiently known species are briefly mentioned.

Our knowledge of distribution of Ephemeroptera in Czechoslovakia is relatively extensive. The basins of the rivers Danube and particularly the Elbe in Czechoslovakia belong to the best-known mayfly areas in Europe (LANDA, 1967). Seventy-seven species of mayflies have previously been recorded from Czechoslovakia (LANDA, 1969, 1977). When studying the distribution and seasonal dynamics of mayflies more than 600 localities lying in the basins of the rivers Elbe, Oder, Vistula and Danube were investigated from 1972—1977. Nineteen species new to the Czechoslovak mayfly fauna were found at some of these localities. Of the supraspecific taxa, the family Ametropodidae and the genera *Metreletus* (family Siphonuridae), *Baetopus* and *Pseudocloeon* (family Baetidae) are now recorded from Czechoslovakia for the first time. The unexpected findings of extremely rare or insufficiently known species in Czechoslovakia and particularly in the Danube basin in Slovakia enable us to give new data on larval bionomy and life cycle.

The data concerning the localities cited are presented in the following sequence: (1) name (in Czech) and type of water biotope (river, stream, brook, pond, etc.); (2) name of adjacent town or village and wider geographic specification; (3) number and sex of adults, number of larvae; (4) name of collector (where not stated all specimens were collected by the author). For common species only lists of the localities and total number of specimens collected in 1972—1977 are given. The localities are arranged in order of river basins (Elbe, Oder, Vistula and Danube). All the material collected is deposited in the collection of the Institute of Entomology, Czechoslovak Academy of Sciences, Praha.

SIPHONURIDAE

Metreletus goethebueri (LESTAGE, 1938)

Syn.: *Metreletus hungaricus* UJHELYI, 1960

Elbe basin: brook, deer park; Dobříš, Central Bohemia; 2 ♂♂, 126 ♀♀; 12. vi. 1976 leg. Z. Pádr; 135 larvae; 13. v. 1977. Židova strouha (brook); Bechyně, South Bohemia; 8 larvae; 4. vi. 1972.

Danube basin: Okna (stream); Remetské Hámre, East Slovakia; 3 ♂♂; 15. vi. 1975 leg. V. Švihla. Štampoch (brook); Bohunice, South Slovakia; 5 ♀♀, 1 larva; 4. vi. 1974.

Distribution: Judging from the distribution of closely related species (DEMOULIN, 1951) *M. goethebueri* belongs among the South-Central European species. Previously known from Belgium, France, Germany and Hungary. Some authors regard *M. goethebueri* as a junior synonym of *M. hessei* (FIZAZINE) described from France. Rare or local but probably generally distributed in Czechoslovakia at altitudes of 250—400 m.

Bionomy: A species with one generation a year. Ovoposited eggs remain in diapause until spring the following year. Older larvae develop very quickly in spring (March—May). Adults fly in May or at the beginning of July. *M. goethebueri* belongs among “summer” species (LANDA, 1968). Larvae live in submontane brooks or streams with rich water and bottom covered with plants. The eggs can survive even only in wet mud during summer (brook, Dobříš).

BAETIDAE

Centroptilum pulchrum EATON, 1885

Syn.: *Centropilum dacicum* BOGOESCU & TABACARU, 1966; *C. potamonensis* JACOB, 1973 p.p.

Elbe basin: Elbe (branch of the river); Nučnický, Central Bohemia; 8 larvae; 19. vi. 1976.

Distribution: Known from the locality of holotype (France) and from Roumania and DDR. Recently found at many localities in Poland (KEFFE-MÜLLER & SOWA, 1975). Larvae live in large submontane rivers and streams in Poland, but in the single Czechoslovak locality they were found in a non-flowing or slightly flowing backwater together with larvae of *Cloeon dipterum*. Larvae extremely rare at this locality.

Baetis calcaratus KEFFERMÜLLER, 1972

Syn.: *Baetis atrebatinus*: LANDA, 1969 p.p. (nec EATON)

Elbe basin: Lužnice (river); Stará Hlína, South Bohemia; 2 larvae; 28. v. 1973. Lužnice (river); Majdalena; 28 larvae; 28. iv. 1974. Nová řeka (river); Mláka; Nová řeka (river), Stříbřec; 15 ♂♂, 10 ♀♀, 54 larvae; 22.—29. vi. 1975. Zlatá stoka (drain); Třeboň, 4 larvae; 29. v. 1973. Zlatá stoka (drain); V Rudě; 1 larva; 8. v. 1974. Starý Hospodář (pond); Chlum u Třeboně; 5 larvae; 4. vi. 1974 leg. J. Matěna. drains; Lomnice n. Lužnicí; 12 larvae; 5. vi. 1974 leg. J. Matěna.

Larvae of this species and probably of the closely related *B. tricolor*, were found at these localities by LANDA (1967, 1969): Lužnice riv., Roudná; Lužnice riv., Klec; Zlatá stoka, Třeboň; Malše riv., Kaplice. Larvae are practically indistinguishable from those of *B. tricolor*. Mature larvae differ from larvae of *B. tricolor* (and of *B. atrebatinus*) by the imaginal characters (costal angulation of hind wings and arrangement of egg chorion). Larvae from South Bohemia were determined as *B. tricolor* which was regarded as a junior synonym of *B. atrebatinus* EATON (LANDA, 1969: 120). Subsequent taxonomic study of the genus *Baetis* (MÜLLER-LIEBENAU, 1970; KEFFERMÜLLER, 1972)

revealed that there are three closely related species: *B. atrebatinus* EATON, 1870; *B. tricolor* TSHERNOVA, 1928 and *B. calcaratus* KEFFERMÜLLER, 1972. The re-examination of the material from South Bohemia revealed that most of specimens (at least all mature larvae) belong to the species *B. calcaratus*. *B. tricolor* is probably restricted to the Danube basin in Czechoslovakia (see below) and *B. atrebatinus* to Western Europe.

Distribution and bionomy: So far known only from the river Warta (KEFFERMÜLLER, 1972) and the Vistula basin (SOWA, 1975), Poland. Probably Central European species. In Czechoslovakia in the basin of Lužnice river (South Bohemia) only. Larvae moderately abundant in rivers and particularly in pond drains at altitudes of 200–400 m. They require the places with moderately flowing water and bottom covered with plants. Life cycle similar to those of *B. tricolor* and *B. atrebatinus*. Two generations a year. Adults of the first generation fly in June and July, adults of the second one in August and September.

Baetis melanonyx (PICTET, 1845)

Syn.: *Baetis kulindrophthalmus* BOGOESCU, 1933; *B. principii* GRANDI, 1949; *B. bengtssoni* MÜLLER-LIEBENAU, 1966

Elbe basin: Divoká Orlice (river); Lišnice, East Bohemia; 34 larvae; 2. vii. 1972. Lučanský potok (brook); Smržovka, North Bohemia; 5 larvae; 26. xii. 1972.

This species was formerly considered to be a synonym of *B. vernus* (CURT.) (LANDA, 1969: 106). MAYER (1939) collected adults near Brno (South Moravia). *B. melanonyx* belongs to the *alpinus* species-group and larvae show affinities to those of *B. alpinus*. The characters distinguishing both larvae and adults of this species-group are given by MÜLLER-LIEBENAU (1970).

Distribution: Known from Central and South Europe. According to SOWA (1975) a species with Central European distribution. So far found in Italy (Aosta, Savonna), Bulgaria (Vitoša Mts.), B. Germany (Mittelgebirgen Mts.), Austria (Lunzer Lake), Roumania and Spain. Rare in the mountain streams and rivers of the Hercynian mountain system in Czechoslovakia at altitudes of 400–600 m. Unknown from Slovakia but probably present in the High Tatra since larvae occur in streams of the Polish part of the mountains. Larvae live in submontane or montane streams with rich permanent water and stony bottom in Bohemia.

Baetis gemellus EATON, 1885

Syn.: *Baetis rhodani*: KIMMINS, 1960 p.p.; *Baetis rhodani*: LANDA, 1969 p.p. (nec EATON).

Elbe basin: Slavonický potok (brook); Slavonice, South Bohemia; 3 larvae; 10. v. 1975.

Vistula basin: Poprad (river); Ružbachy, North Slovakia; 1 larva; 18. viii. 1975.

Danube basin: Demänovka (stream); Demänovská jaskyňa, Central Slovakia; 2 larvae; 12. vii. 1973. Solisková voda (stream); Važec, Central Slovakia; 1 larva; 15. vii. 1973. Čremošňa (stream); Drnava, Central Slovakia; 1 larva; 15. vii. 1974 leg. M. Tonner.

This species was formerly regarded as a synonym of *B. alpinus* or *B. rhodani*. STEINMANN (1907) described larvae of *B. alpinus* as *B. gemellus* and many authors (LESTAGE, 1919 and others) followed this interpretation. KIMMINS (1960) regards the name as a junior synonym of *B. alpinus* and the species *B. gemellus* sensu EATON (nec STEINMANN) as identical with the closely related *B. rhodani* (PICTET). This interpretation was followed by

LANDA (1969 : 112). *Baetis gemellus* EATON was reinstated and redescribed by MÜLLER-LIEBENAU (1970).

Distribution and bionomy: A montane species, occurring in the Central and South European mountain ranges: Pyrenees (France, Spain), Alps and Appenines (Italy). Also known from the European part of the USSR and Austria. Dr. Jacob (Dresden) found larvae in a mountain stream near Kežmarok in the High Tatra in 1966 (MÜLLER-LIEBENAU, 1970). Larvae live in montane or submontane streams with stony bottom together with larvae of *B. rhodani* and *B. alpinus*. Taking into account the bionomy of related species (LANDA, 1968; SOWA, 1975) two generations a year; probably only one generation a year at higher altitudes. Very rare in Bohemia; solitary to rare in the Slovakian mountains at altitudes of 400—1500 m.

Baetis pentaplebodes UJHELYI, 1966

Danube basin: Turňa (brook); Hrhov, South Slovakia; 3 larvae; 9. vii. 1975; 7 larvae; 24. viii. 1977. Bodva (river); Turňanske podhradie, South Slovakia; 6 larvae; 10. vii. 1975. Čierna voda (brook); Zahálka, East Slovakia; 15 ♂♂, 11 ♀♀, 54 larvae; 17. viii. 1977.

Distribution: Previously known only from Hungary, Veresegyhás (UJHELYI, 1966). Abundant to very abundant at three Czechoslovak localities, probably occurring only in South and Eastern Slovakia. *B. pentaplebodes* seems to be a species with Central European distribution.

Bionomy: A species with two generations a year. The specimens of the first (spring) generation very rare, specimens of summer generation abundant where the species occurs. Adults of summer generation fly in August and September. Larvae live in brooks, pond drains and rivers at lowland localities. They prefer the places with moderately flowing water and bottom covered with plants.

Baetis sinaicus (BOGOESCU, 1931)

Syn.: *Acentrella sinaica* BOGOESCU, 1931; *Baetis atrebatinus*: GRANDI, 1948 (nec EATON); *Baetis subatrebatinus* GRANDI, 1957; *B. pseudatrebatinus* GRANDI, 1960.

Danube basin: Cirocha (river); Stakčín, East Slovakia; 2 larvae; 16. vii. 1975. Podhorodský potok (brook); Podhorod, East Slovakia; 1 larva; 20. viii. 1977.

Distribution: South-Central European species, previously known only from Roumania (Sinaia) and Poland (East Beskid Mts.). Only in the foothills of the East Beskid Mts. in Eastern Slovakia. Recently found in Central Slovakia at an altitude about 600—700 m (KRNO, 1978). Rare at East Slovakian localities. The relatively high abundance of this species in adjacent regions (South-Eastern Poland), suggests that larvae will be undoubtedly found at a large number of localities in Eastern and Central Slovakian mountains and highlands.

Baetis tricolor TSHERNOVA, 1928

Syn.: *Baetis atrebatinus*: LANDA, 1969 p.p.

Danube basin: Ipel (river); Salka, South Slovakia; 17 larvae; 1. vi. 1974. Hron (river); Kamenica, South Slovakia; 4 larvae; 2. vi. 1975. Litavka (brook), Čabrad; 9 larvae; 7. vii. 1975. Hornád (river) Ždaňa, East Slovakia; 7 larvae; 9. vii. 1975.; Latorica (river); Leles, East Slovakia; 38 larvae, 5 subimagoes, 2 ♀♀; 29. v. 1974. Uh (river); East Slovakia; 1 ♂, 2 ♀♀, 3 larvae; 10. vii. 1975. Bodrog (river); Streda, East Slovakia; 1 larva; 27. v. 1974. Tisa (river); Trakany, East Slovakia; 7 larvae; 12. vii. 1975; 15 larvae; 18. viii. 1977.

The larvae and imagoes found in the Danube basin in Czechoslovakia are morphologically identical with those redescribed by MÜLLER-LIEBENAU (1970). It is possible to assume that all populations of complex *B. atrebatinus*—*B. tricolor*—*B. calcaratus* in the Danube basin belong to the species *B. tricolor* which is replaced by *B. calcaratus* in Bohemia (see above) but *B. calcaratus* might be distributed in the Danube basin as well. Investigation of distribution of *B. calcaratus*—*B. tricolor* in Slovakia requires material of adults because of morphologically identical larvae.

Distribution: Widespread Eurasian species, occurring in the USSR (Lithuanian and Estonian SSR, Oka riv., Angara riv.), Poland (Warta, San and Bug rivs.), Bulgaria (Marica riv.), Jugoslavia (Macedonia) and Roumania. In Czechoslovakia generally distributed in the larger East and South Slovakian rivers at altitudes of 100—200 m. Solitary to rare at these lowland localities.

Baetis vardarensis IKONOMOV, 1962

Danube basin: Nitra (river); Topolčany, South Slovakia. Hornád (river); Ždaňa. Ondava (river); Vranov. Torysa (river); Rožkovany. Cirocha (river); Humenné. Uh (river); Lekárovec. Podhorodský potok (brook); Podhorod. brook; Ruský Hrabovec; East Slovakia; 48 larvae, 12 subimagoes; 9.—15. vii. 1975.

Vistula basin: Dunajec (river); Červený Kláštor, North Slovakia; 34 larvae; 18. viii. 1975. Poprad (river); Plaveč, North Slovakia; 21 larvae, 8 subimagoes; 17. vii. 1975.

Distribution: South-Central European species, previously known from Jugoslavia (Macedonia) and Poland (Raba, Dunajec and Poprad rivs.), and recently found in South France, Spain and Portugal (MÜLLER-LIEBENAU, 1974). Abundant in the Danube basin in Czechoslovakia at altitudes of 400—700 m. In favourable conditions (rapidly flowing water and stony bottom), the larvae occur also in lowland localities (Hornád and Uh rivs.). Larvae of this species (adults unknown so far) are closely related to those of *B. lutheri* from which they differ mainly in a much longer paracercus (SOWA, 1975). It is possible to assume that numerous new localities will be discovered after re-examination of larval material of *B. lutheri* from Slovakia. At the most of localities cited larvae live together with larvae of *B. lutheri*.

Baetopus tenellus (ALBARDA, 1878)

Syn.: *Centroptilum tenellum* ALBARDA, 1878, *Baetis niger*: LESTAGE, 1918, *Baetopus balticus* KAZLAUSKAZ & SANWAJTITE, 1962

Danube basin: Ulička (stream); Ulič, East Slovakia; 1 larva; 16. vii. 1975.

This species was originally described in the genus *Centroptilum* EATON. SOWA (1975) regards this species as congeneric with *Baetopus wartensis* KEFFERMÜLLER, 1960 described from Central Poland. MÜLLER-LIEBENAU (1978) places *B. tenellus* in the new genus *Raptobaetopus* together with the species described from Malaysia.

Distribution: According to SOWA (1975) Central European species. Originally described from Holland but occurring also in Poland, Finland and in European part of the USSR. Extremely rare where it occurs. Probably only in Eastern Slovakia in Czechoslovakia. In the single Slovakian locality larva found at altitude of approximately 400 m.

Procloeon ornatum TSHERNOVA, 1928

Syn.: *Cloeon rufulum* auct. p.p.

Danube basin: Litavka (brook); Čabrad, South Slovakia; 1 larva; 7. vii. 1975. Ubla (river); Ubla, East Slovakia; 2 larvae; 15. vii. 1975.

Larvae show close affinities with those of *P. rufulum* ETN. and the revision of material mentioned in hydrobiological papers from the Danube basin is necessary. Both species occur in Slovakia; in Bohemia (Elbe basin) probably only *P. rufulum* (= *P. pseudorufulum* KIMMINS, 1957; *P. pseudorufulum*: LANDA, 1969: 135 p.p.) occurs. The characters distinguishing both larvae and adults of these species are given by SOWA (1975).

Distribution: Eurasian species, known from the European part of the USSR and Poland (SOWA, 1975). Larvae live in small rivers at altitudes of 200—300 m in South and East Slovakia. A species of rare occurrence; larvae usually found together with larvae of *P. rufulum* EATON.

Pseudocloeon inexpectatum TSHERNOVA, 1928

Danube basin: Ipel (river); Lela, South Slovakia; 78 larvae; 2. vi. 1974. Hron (river); Kamenica, South Slovakia; 16 ♂♂, 12 ♀♀, 130 larvae; 3. vi. 1975. Laborec (river); Michalovec, East Slovakia; 2 larvae; 27. v. 1974. Ondava (river); Vranov, East Slovakia; 31 larvae; Ubla (stream); Ubla, East Slovakia; 26 larvae; 15. vii. 1975. Brook; Ruský Hrabovec, East Slovakia; 14 larvae; 17. viii. 1977. Brook; Ulič Krivé, East Slovakia; 4 larvae; 17. vii. 1975.

Vistula basin: Poprad (river); Plaveč, North Slovakia; 2 subimagos, 4 larvae; 17. vii. 1975.

Distribution and bionomy: Widespread Eurasian species, occurring in the European part of the USSR, Poland, Sweden and Finland. Larvae in streams and rivers in Slovakia at altitudes of 200—300 m. They require rapidly flowing water and stony bottom. In favourable conditions, the larvae occur in lowland localities (Ipel and Hron rivs.) as well. Abundant where it occurs. Two generations a year. Adults of the first generation fly in May and June, adults of the second one in August and September. Older larvae in April and May or July and August.

AMETROPODIDAE

Ametropus eatoni BRODSKY, 1930

Danube basin: Latorica (river); Leles, East Slovakia; 1 ♂; 28. v. 1974. Latorica; Zatin, East Slovakia; 1 ♀ subimago; 25. v. 1974.

Adults from East Slovakia are morphologically identical with those re-described from Poland (KEFFERMÜLLER, 1959; JAŹDŹEWSKA, 1973); no larval material has been available from this locality (Latorica riv.). The differences between this species and *A. fragilis* ALBARDA, 1878 are very slight. According to LANDA (1969: 140) *A. eatoni* might be a junior synonym of *A. fragilis*. Larvae of *A. fragilis* remain still unknown; adults were described from the Netherlands.

Distribution: Eurasian species, widely distributed in East and South Europe; known from Poland (Warta, Vistula, San rivs.), Bulgaria (Danube), Estonian SSR (Narva riv.), Armenia and South-East Siberia. Probably only in large lowland rivers of the Tisa basin in Czechoslovakia. Larvae require a sandy bottom (semiburrowers) and well oxygenated water. In Bulgaria larvae thrive in the Danube, but they are absent in this river in Czechoslovakia because of water pollution.

OLIGONEURIIDAE

Oligoneuriella mikulskii SOWA, 1961

Syn.: *Oligoneuriella poecile* IKONOMOV, 1962.

Danube basin: Tisa (river); Malé Trakany, East Slovakia; 2 larvae; 12. vii. 1975.

Distribution: South-Central European. Known from numerous localities in Poland (SOWA, 1973) and from Yugoslavia (Macedonia). Distribution in Czechoslovakia probably the same as *Ametropus eatoni* BR. Larvae require situations with a muddy bottom and aquatic plants or roots in large lowland rivers.

HEPTAGENIIDAE

Ecdyonurus starmachi SOWA, 1971

Danube basin: Desná (stream), Kouty; North Moravia. Brook, Brničko; North Moravia. Benkovský potok (brook), Benkovo; Hybica (stream), Východná, Hlboký jarok (brook), Važec; Demänovka (stream), Liptovský Mikuláš; Central Slovakia. Štampoch (brook), Bohunice; Slatina (river), Zvolen; Čremošňa (brook), Krásnohorská Dlhá Lúka; brook, Gombasek (leg. M. Tonner); South Slovakia. Okna (stream), Sečovce; Porúbský potok (brook), Poruba pod Vihorlatom; brook, Ulič Krivé; Hlboký potok (stream), Nová Sedlica; stream, Stakčín; Cirocha (stream), Stakčín; stream, Zboj; East Slovakia. 187 ♂♂, 96 ♀♀, 14 subimagoes, 415 larvae; 4. vii. 1972–20. viii. 1977, adults 3. vi. – 29. vii.

Vistula basin: Lipník (stream), Červený Kláštor; brook, Vyšné Ružbachy; Malý Poprad (stream), Štrba; brook, Spišské Hanušovice; North Slovakia. 105 larvae; 11.–18. vii. 1975.

Distribution: Central European species, previously known only from South-Eastern Poland. Common in the Slovak mountains and foothills, abundant in Moravia (Jeseníky Mts.), apparently absent in Bohemia (Elbe basin). Larvae live in brooks and streams at altitudes of 300–600 m, and in the High Tatra at altitudes of 500–950 m. They require submontane streams with rich permanent water and stony bottom. Larvae live together with larvae of *E. submontanus* LANDA.

Rhithrogena ferruginea NAVÁS, 1905

Syn.: *Rhithrogena semicolorata*: LANDA, 1969 p.p.

Elbe basin: Travná (brook), Háje; Blšanka (brook), Trnovany; Dibeřský potok (brook), Peruc (leg. J. Albert); brook, Kadaň; North Bohemia. Stream, Talmberk; brook, Český Šternberk; Kájovský potok, Kácov; brook, Stříbrná Skalice; Central Bohemia. Kyselý potok, Úsilné; Černá (stream), Benešov; Dračice (river), Klikov; Blanice (river) Bavorov; Bilinský potok (brook), Koloděje; Lužnice (river), Suchdol; South Bohemia. Otava (stream), Divišov; Úhlava (stream), Janovice; Strážovský potok (brook), Strážov; Mže (river) Tachov; West Bohemia. Příbramský potok (brook), Příbram; Central Bohemia (leg. J. Doležal). 498 ♂♂, 329 ♀♀, 1165 larvae, 173 subimagoes, 4. iii. 1972–20. viii. 1977, adults 29. v. – 24. viii.

Oder basin: Budišovka (river), Černná; brook, Lesní Albrechtice; North Moravia. 28 larvae; 5. v. 1977.

Danube basin: Benkovský potok (brook), Benkovo; Solisková voda (stream), Važec; brook, Topolčianky; Starý potok (brook); Zvolen; Central Slovakia. Torysa (river), Rožkovany; brook, Ruský Hrabovec; Porúbský potok, Porúbka pod Vihorlatom. East Slovakia. 5 ♀♀, 2 subimagoes, 145 larvae; 1. vii. 1973–20. viii. 1977.

Vistula basin: Malý Poprad (stream), Štrba; Poprad, Ružbachy; Dunajec (river), Červený Kláštor; Lipník (stream), Červený Kláštor; North Slovakia. 108 larvae, 14.–18. vii. 1975.

Distribution: South-Central European species, common in mountain and mountain slope brooks, stream and rivers. Larvae live at altitudes of 250 to 800 m, and in the High Tatra at altitudes of 700–1000 m. Very abundant

or common at localities where it occurs. Bionomy and life cycle are similar to those of *R. semicolorata*.

Rhithrogena iridina (KOLENATI, 1860)

Syn.: *Rhithrogena semicolorata*: LANDA, 1969 p.p.

Elbe basin: Kocába (brook), Stará Huť; Central Bohemia; Otava (stream), Antygl; Otava (river), Horaždovice; Ostružná (stream), Velhartice; stream, Rejštejn; West Bohemia; stream, Černé údolí; South Bohemia. 72 ♂♂, 65 ♀♀, 696 larvae, 56 subimagos, 3. ii. 1973–5. v. 1978.

Oder basin: Desná (stream), Kouty; North Moravia, 34 larvae; 23. vii. 1973.

Danube basin: Studený potok (stream), Habovka (leg. J. Matěna); Polhoranka (stream), Oravská Polhora (leg. J. Matěna); Dlhopolka (stream), Javorníky Mts.; West Slovakia. Mlyničná voda (stream), Važec; Biely Váh (river), Važec; Čremošňa (stream), Borka; Central Slovakia. Ondava (river), Vranov; Cirocha (river), Humenné; Hlboký potok (brook), Nová Sedlica; Okna (stream), Remetske Hámre; brook, Ulič Krivé; stream, Riabí skala (leg. J. Doležal); East Slovakia. 56 ♂♂, 47 ♀♀, 7 subimagos, 879 larvae; 24. v. 1973–20. viii. 1977, adults 24. v.–8. viii.

Vistula basin: stream, Spišské Hanušovice; North Slovakia; 7 larvae; 18. vii. 1975.

There are probably two subspecies of *R. iridina* in Czechoslovakia. The populations from the Elbe basin (especially from West Bohemia) belong probably to *R. iridina iridina* (Kol.), the populations from Slovakia are identical with those of *R. iridina carpathica* SOWA. The limit of this synpatric subspecies is bounded by the Morava river basin in Czechoslovakia.

Distribution: South-Central European species, occurring in streams, large brooks and rivers at altitudes of 250–800 m. Common at altitudes of 700–1200 m in the Low and High Tatra. In the Elbe basin found only in South and Western Bohemia. Larvae prefer montane streams with rapidly flowing water. Bionomy and life cycle are similar to those of *R. semicolorata* and *R. ferruginea*. Adults fly in July and August at higher altitudes.

CAENIDAE

Caenis rivulorum EATON, 1884

Danube basin: Cirocha (stream), Stakčín; East Slovakia; 4 larvae; 16. vii. 1975. Ulička (brook), Kolbasov; East Slovakia; 2 larvae; 17. vii. 1975.

Distribution: North-Central European species, previously only known from Scandinavia, USSR and Poland. The south-eastern limit of distribution is probably formed by the Carpathians. Rare in Czechoslovakia, occurring in foothills at altitudes of 300–400 m. Larvae live in small rivers together with larvae of *Caenis macrura* (STEPH.).

Brachycercus minutus TSHERNOVA, 1952

Danube basin: Ipel (river); Lela, South Slovakia; 3 larvae; 25. v. 1975.

Distribution: Widespread Palaearctic species, known from Eastern Siberia (Amur basin), European USSR and Poland. In Czechoslovakia rare in the Danube basin. Larvae live in lowland rivers together with larvae of *Brachycercus harrisella* CURT. This extremely rare species is probably distributed only in the Danube basin in Czechoslovakia, only *B. harrisella* occurs in the Elbe basin.

DISCUSSION

Three groups of species new to the Czechoslovak mayfly fauna have been found in the past six years. The first group comprises twelve species collected

in Czechoslovakia for the first time. They occur mainly in the Danube basin and have probably been overlooked previously because less attention has been devoted to faunistic research of water insects in this region. The second group comprises five species which have changed their taxonomic position, and the third group two species only recently described. These seven species were not therefore included in the detailed taxonomic work on Central European species by LANDA (1969).

Since there is a great deal of faunistic data on Ephemeroptera from the Elbe basin (LANDA, 1967) only two species new to the Czechoslovak fauna were discovered in this area (*Metreletus goetghebueri* and *Centroptilum pulchrum*). These species were found at localities not investigated in the past. *Baetis calcaratus*, abundant in the Lužnice river basin, was at first interpreted as the closely related *B. atrebatinus* EATON (LANDA, 1967, 1969) which seems to be distributed only in West Europe. *Baetis gemellus* and *B. melanonyx* which were redescribed by MÜLLER-LIEBENAU (1970) had been synonymized with the closely related *B. rhodani* (PICTET) and *B. alpinus* (PICTET) respectively before 1970. *Rhithrogena ferruginea* and *R. iridina*, recently re-described by SOWA (1971) and common in foothill and mountain localities, had been synonymized with *Rhithrogena semicolorata* (CURTIS) before 1971. It is apparent that previously recorded specimens treated in numerous hydrobiological and faunistic papers will have to be re-examined.

With the exception of *Baetis melanonyx* all species mentioned above are distributed in the Vistula and Danube basins as well. *B. melanonyx* is a rare montane species probably occurring at some South Moravian localities but no specimens are available (MAYER, 1939). One specimen (adult male) caught near Brno (South Moravia) is deposited in the collections of the British Museum (Nat. Hist.) (leg. Mayer, det. Kimmins). This specimen is identical with adult of *B. vernus* (CURTIS) (Landa, pers. comm.).

There is a rather different situation in the Danube and Vistula basins. Only a few localities have so far been investigated in detail in the Slovakian river basins. List of found species is given by ZELINKA & ROTHSCHNEIN (1967). Many species of mayflies found in the Elbe basin localities were also found in the western part of the Danube basin in Moravia. The species new to the Czechoslovak fauna were mostly found in the eastern part of the Danube basin and consist of four groups, as follows.

(i) Palaearctic and Eurasian species which penetrate the Danube basin from the east (*Baetis tricolor*, *Procloeon ornatum*, *Pseudocloeon inexpectatum*, *Ametropus eatoni*, *Brachycercus minutus*). These species do not occur in the West Palaearctic Provinces and the western limit of their distribution is bounded by the Morava river basin in Czechoslovakia. (ii) Species with South-Central European distribution which penetrate northern areas of the Danube basin from the south (*Metreletus goetghebueri*, *Baetis sinaicus*, *B. vardarensis*, *Oligoneuriella mikulskii*, *Rhithrogena ferruginea*, *R. iridina*). Some of them are widespread in Western Europe (*B. vardarensis*, *R. ferruginea*, *R. iridina*). The northern limit of their distribution lies in Central Poland. (iii) Central European species which penetrate the Elbe basin from the east (*Baetopus tenellus*, *E. starmachi*). This group probably comprises *Baetis pentaplebedes* as well. (iv) North-Central European species which penetrate the Danube basin from the north (*Caenis rivulorum*). Although *C. rivulorum* was found only in East Slovakian localities its distribution in

Czechoslovakia seems to be the same as *Arthroplea congener* BENGTTSSON or *Heptagenia fuscogrisea* (RETZ.) (cf. LANDA, 1954, 1969).

Most localities, especially of the Eastern Slovakia river basins (Ondava, Laborec, Uh, Latorica and others), are practically unknown from the entomological and hydrobiological point of view. Therefore it can be expected that further species new to the Czechoslovak mayfly fauna will be discovered.

REFERENCES

- DEMOULIN G., 1951: A propos de *Metretopus goethebueri* Lestage 1938, et des *Metretopodidae* (Insectes, Éphéméroptères). *Bull. Inst. r. Sci. Nat. Belg.*, **27** (49) : 1–20.
- JAŽDŽEWSKA T., 1973: Notes on the biology and ecology of the mayfly *Ametropus eatoni* Brodskij (Ephemeroptera). *Polsk. pismo ent.*, **43** : 469–477.
- KEFFERMÜLLER M., 1959: Nowe dane dotyczące jetek (Ephemeroptera) z rodzaju *Ametropus* Alb. i *Behningia* Lest. *Prace Kom. Biol. Pozn. TPN, Poznan*, **19** : 1–32.
- KEFFERMÜLLER M., 1972: Investigations on the mayflies (Ephemeroptera) fauna in Wielkopolska. *V. Bull. Ent. Pologne*, **42** : 527–533.
- KEFFERMÜLLER M. & SOWA R., 1975: Les espèces du groupe *Centroptilum pulchrum* Eaton (Ephemeroptera, Baetidae) en Pologne. *Polsk. pismo ent.*, **45** : 479–486.
- KIMMINS, D. E., 1960: The African species of the genus *Cheumatopsyche* (Trichoptera, Hydropterygidae) and the Ephemeroptera types of species described by A. E. Eaton, R. McLachlan and F. Walker. *Bull. Brit. Mus. (Nat. Hist.) Ent.*, **9** : 255–318.
- KRNO I., 1978: Notes on the occurrence of novel species of mayflies (Ephemeroptera) in Slovakia. *Biológia, Bratislava*, **33** : 153–156.
- LANDA V., 1954: K výskytu severských druhů jepic v Československu. (The occurrence of mayfly species from North in Czechoslovakia). *Čas. Čs. spol. ent.*, **51** : 225–236 (in Czech).
- LANDA V., 1967: Systematika, sezonní dynamika a srovnávací anatomie řádu Ephemeroptera. II. Rozšíření a sezonní dynamika jepic v povodí Labe a v ČSSR. (The systematics, seasonal dynamics and comparative anatomy of the order Ephemeroptera. II. The distribution and seasonal dynamics of mayflies in the Elbe basin and in the ČSSR). DSc. theses. 151 pp., Praha (in Czech).
- LANDA V., 1968: Developmental cycles of Central European mayflies and their interrelations. *Acta ent. bohemoslov*, **65** : 276–284.
- LANDA V., 1969: Jepice — Ephemeroptera. *Fauna ČSSR*, **18** : 1–347. Academia, Praha.
- LANDA V., 1977: Ephemeroptera. In: Check-List of Czechoslovak insects. *Acta faun. ent. Mus. Nat. Pragae*, Suppl., **4** : 23–26.
- LESTAGE J. A., 1918: Contribution à l'étude des larves des Éphémères paléarctiques. Sér. II. *Ann. Biol. lacustre*, **8** : 89–182.
- MAYER K., 1939: Entomologické poznámky z okolí Rájce. (Entomological notes from the surroundings of Rájce.) *Sbor. Přírodověd. klubu v Třebíči*, **3** : 21–25 (in Czech).
- MÜLLER-LIEBENAU I., 1970: Revision der europäischen Arten der Gattung *Baetis* Leach, 1815 (Insecta, Ephemeroptera). *Gewäss. Abwäss.*, **48/49** : 1–214.
- MÜLLER-LIEBENAU I., 1974: Baetidae aus Südfrankreich, Spanien und Portugal (Insecta, Ephemeroptera). *Gewäss. Abwäss.*, **53/54** : 7–42.
- MÜLLER-LIEBENAU I., 1978: Raptobaetopus, eine neue carnivore Ephemeropteren-Gattung aus Malaysia (Insecta, Ephemeroptera: Baetidae). *Arch. Hydrobiol.*, **82** : 465–481.
- SOWA R., 1971: Sur la taxonomie de *Rhithrogena semicolorata* (Curtis) et de quelques espèces d'Europe continentale (Ephemeroptera: Heptageniidae). *Rev. suisse Zool.*, **77** : 895–920.
- SOWA R., 1973: Contribution à l'étude des *Oligoneuriella* Ulm. européennes Ephemeroptera, *Oligoneuriidae*). *Bull. Acad. Polon. Sci., Sci. Biol.*, **21** : 657–665.
- SOWA R., 1975: Notes on the European species of *Procloeon* Bengtsson with particular reference to *Procloeon bifidum* (Bengtsson) and *Procloeon ornatum* Tshernova (Ephemeroptera; Baetidae). *Ent. scand.*, **6** : 1–8.
- SOWA R., 1975: Ecology and biogeography of mayflies (Ephemeroptera) of running waters in the Polish part of the Carpathians. I. Distribution and quantitative analysis. *Acta hydrobiol.*, Kraków, **17** : 223–297.
- STEINMANN P., 1907: Die Tierwelt der Gebirgsbäche. *Rhithrogena semicolorata*. *Ann. Biol. lacustre*, **2** : 30–150.
- UJHELYI S., 1966: The mayflies of Hungary, with the description of a new species, *Baties pentapleobodes* sp. n. (Ephemeroptera). *Acta Zool. hung.*, **2** : 203–210.
- ZELINKA M. & ROTHSCHNEIN J., 1967: Die Ephemeropteren der Slowakei. *Acta rer. nat. Mus. nat. Slov.*, **13** : 61–71.

Новые для фауны Чехословакии виды поденок (Ephemeroptera), найденные в 1972—1977 годах

Фаунистика, биотопы, зоогеография

Резюме. В течение прошедших 6 лет проводилось исследование фауны поденок на более, чем 600 местонахождениях в бассейнах рек Эльбы, Одера, Вислы и Дуная. Было найдено 12 ранее неизвестных из Чехословакии видов поденок: *Metreletus goethgebueri* (Lest.) (Siphonuridae); *Centroptilum pulchrum* Etn., *Baetis pentaplebodes* Ujhelyi, *B. sinicus* (Bog.), *B. vardarensis* Ikonov, *Baetopus tenellus* (Alb.), *Procleon ornatum* Tshern., *Pseudocloeon inexpectatum* Tshern. (Baetidae); *Ametropus eatoni* Brod. (Ametropodidae); *Oligoneuriella mikulskii* Sowa (Oligoneuriidae); *Brachycercus minutus* Tshern. *Caenis rivulorum* Etn. (Caenidae). Далее было обнаружено 7 видов, описанных или вновь описанных после 1970 г. (и не включенных в Фауну ЧССР): *Baetis calcaratus* Keffermüll., *B. gemellus* Etn., *B. melanonyx* (Pict.), *B. tricolor* Tshern. (Baetidae); *Ecdyonurus starmachi* Sowa, *Rhithrogena ferruginea* Navás, *R. iridina* (Kol.) (Heptageniidae). Дается обзор известного распространения всех приведенных видов и список их местонахождений в Чехословакии. Обсуждаются зоогеографические связи найденных видов.

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