

October 1994

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Recommended Citation

Hubbard, Michael D. 1994. "The Mayfly Family Behningiidae (Ephemeroptera: Ephemeroidea): Keys to the Recent Species With a Catalog of the Family," *The Great Lakes Entomologist*, vol 27 (3)

DOI: <https://doi.org/10.22543/0090-0222.1856>

Available at: <https://scholar.valpo.edu/tgle/vol27/iss3/6>

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THE MAYFLY FAMILY BEHNINGIIDAE (EPHEMEROPTERA:
EPHEMEROIDEA): KEYS TO THE RECENT SPECIES
WITH A CATALOG OF THE FAMILY

Michael D. Hubbard¹

ABSTRACT

Keys to the known Recent species of the mayfly family Behningiidae are presented. Also included is a catalog of references to the genera and species of the Behningiidae, along with indications of described stages and geographical distributions.

The mayfly family Behningiidae is one of the smallest families of the Ephemeroptera. It comprises only four genera: the three Recent genera *Behningia* Motaş & Băcesco, *Dolania* Edmunds & Traver, and *Protobehningia* Tshernova, and the Jurassic fossil genus *Archaeobehningia* Tshernova. To date there are only seven described species in the family.

Although McCafferty (1991) recently elevated the Behningiidae to its own superfamily, he presented little data (McCafferty 1979, McCafferty & Edmunds 1976) to support his rationale and his arguments therefore remain unconvincing. I still consider the family to belong in the Ephemeroidea, and accordingly, following standard practice among mayfly workers, I have left it placed therein.

Keys to the known stages of the nymphs and imagoes of the Recent species of the Behningiidae are presented.

The catalog is intended to be a comprehensive, but certainly not exhaustive, listing of references in the scientific literature to all known species of the Behningiidae. Included with each species are indications of the geographic distributions listed in the scientific literature. Listed with the references to taxonomic papers are indications of the stage described or figured. Only selected taxonomic references are given for each genus.

This paper is one in a continuing series of catalogs of the Ephemeroptera (c.f. Hubbard & Pescador 1978, Hubbard & Peters 1978, Hubbard 1979, 1982a, 1982b, 1986, 1987, 1990, Hubbard & Savage 1981, Hubbard, Dominguez & Pescador 1992).

Family Behningiidae Tshernova, 1938
Behningiidae Tshernova, 1938, 1938:131.

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Genus *Archaeobehningia* Tshernova

Archaeobehningia Tshernova, 1977, 1977:94; Soldán, 1979, 72:636; Kaludina, 1980, 178:229; Tshernova, 1980, 178:33; Landa & Soldán, 1985, 4:99; Hubbard, 1987, 129:61; Peters & Gillies, 1991, p:211.

Type-species: *Archaeobehningia edmundsi* Tshernova, original designation.

***Archaeobehningia edmundsi* Tshernova**

Archaeobehningia edmundsi Tshernova, 1977, 1977:95, fig. 2, pl. 10 fig. 2 (nymph); Sinitshenkova, 1985, 211:22; Hubbard, 1987, 129:62; Peters & Gillies, 1991, p:211.

Archaeobehningia [sic] *edmundsi*; Sinitshenkova, 1984, p:63.

Distribution: Jurassic of Russian Transbaikal (fossil).

Genus *Behningia* Lestage

Behningia Lestage, 1930, 69:436; Tshernova, 1938, 1938:131; Lestage, 1938, 78:315; Tshernova, 1940, 1:130; Bertrand, 1954, p:254; Edmunds & Traver, 1959, 52:46; Tshernova & Bajkova, 1960, 39:415; Landa, 1969, 18:295; McCafferty, 1975, 101:451; Soldán, 1979, 72:636; Landa & Soldán, 1985, 4:99; Peters & Peters, 1986, 69:246; Tshernova et al. 1986, 1:111; Peters & Gillies, 1991, p:211.

Type-species: *Behningia ulmeri* Lestage, monotypy.

***Behningia lestagei* Motaş & Băcesco**

Behningia lestagei Motaş & Băcesco, 1937, 24:27, fig. 1-2 (nymph); Lestage, 1938, 78:315 (nymph); Motaş & Băcesco, 1940, 26:78, figs. 1-4, pl. 1 (nymph); Demoulin, 1952, 28(21):1; Demoulin, 1955, 91:207; Keffermüller, 1957, 7:254; Edmunds & Traver, 1959, 52:46, fig. 13-23 (nymph); Poprawska, 1960, 4:160; Tshernova & Bajkova, 1960, 39:410; Keffermüller, 1963, 12:323; Brodsky, 1974, 53:296, fig. 1g (adult); Koss & Edmunds, 1974, 55:324, pl. 12 fig. 138-139 (egg); Peters & Peters, 1977, 62:409; Tshernova, 1977, 1977:95; Soldán, 1979, 72:636; Puthz, 1978, 2:263; Fink, Soldán, Peters & Peters, 1991, 69:1083.

[?] *Behningia lestagei*; Bertrand, 1954, p:254, fig. 123 (nymph).

Behningia lestagei ?; Keffermüller, 1959, 19(5):8, pl. 4-7, 9-12 (male, female, nymph); Keffermüller, 1960, 19(8):6; Peters & Peters, 1986, 69:245.

Behningia ulmeri; Landa, 1969, 18:295, pl. 28 (male, female, nymph).

Behningia ulmeri [partim]; Kluge, 1989, pl. 5 fig.3-4 (nymph).

Distribution: Moldavia, Poland, Czechoslovakia, Romania.

***Behningia tshernovae* Edmunds & Traver**

Behningia ulmeri (?); Tshernova, 1938, 1938:132, fig. 1-4 (male).

Behningia ulmeri [partim]; Tshernova, 1940, 1:133; Kluge, 1989, pl. 5 fig.3-4 (nymph).

Behningia ulmeri ?; Demoulin, 1952, 28(21):1, fig. 5 (male); Tshernova, 1952, 3:248, figs. 20-24 (nymph); Tshernova, 1958, 37:73.

Behningia ulmeri; Bertrand, 1954, p:254, fig. 124 (male).

Behningia tshernovae Edmunds & Traver, 1959, 52:47, fig. 23-30 (male, nymph); Landa, 1969, 18:297; Peters & Peters, 1977, 62:409; Tshernova,

1977, 1977:95; Tiunova, 1986, p:21; Tshernova et al. 1986, 1:111, fig. 48(1-4) (male).

Distribution: Eastern Russia.

***Behningia ulmeri* Lestage**

"Nov. gen., nov. sp. ?" Behning, 1924, 1:252, fig. 33-34 (nymph).

"Merkwürdige Ephemeriden-Nymphe" Ulmer, 1924, 7:3, fig. 1-6 (nymph).

Behningia ulmeri Lestage, 1930, 69:436; Motaş & Băcesco, 1937, 24:25 (nymph); Lestage, 1938, 78:315 (nymph); Motaş & Băcesco, 1940, 26:78 (nymph); Demoulin, 1952, 28(21):1; Demoulin, 1955, 91:207; Keffermüller, 1957, 7:254; Edmunds & Traver, 1959, 52:46, fig. 22; Tshernova & Bajkova, 1960, 39:410; Peters & Peters, 1977, 62:410; Tshernova, 1977, 1977:95; Soldán, 1979, 72:636; Puthz, 1978, 2:263; Peters & Gillies, 1991, fig. 9, 12-13 (male).

Behningia ulmeri [partim]; Tshernova, 1940, 1:133; Kluge, 1989, pl. 5 fig.3-4 (nymph).

Behningia ulmeri ?; Klyutschareva, 1963, Zoologicheskii Zhurnal 42:1604.

[not] *Behningia ulmeri*; Tshernova, 1938, 1938:132, fig. 1-4; Bertrand, 1954, p:254, fig. 124 (male); Bertrand, 1954, p:254; Landa, 1969, 18:295, pl. 28 (male, female, nymph).

[not] *Behningia ulmeri* ?; Demoulin, 1952, 28(21):1, fig. 5 (male); Tshernova, 1952, 3:248, figs. 20-24 (nymph); Tshernova, 1958, 37:73.

Distribution: Russia.

Genus *Dolania* Edmunds & Traver

Dolania Edmunds & Traver, 1959, 52:46; Tshernova & Bajkova, 1960, 39:415; McCafferty, 1975, 101:451; Edmunds, Jensen & Berner, 1976, p:274; Berner, 1977, 22(1):48; Peters & Peters, 1977, 62:409; Landa & Soldán, 1985, S4:99; Berner & Pescador, 1988, p:259; Peters & Gillies, 1991, p:211.

Type-species: *Dolania americana* Edmunds & Traver, original designation.

***Dolania americana* Edmunds & Traver**

Dolania americana Edmunds & Traver, 1959, 52:46, figs. 1-16, 31-32 (nymph); Tshernova & Bajkova, 1960, 39:414; Edmunds, 1962, 12(5):17; Schneider, 1966, 29:205; Peters & Jones, 1973, p:246; Koss & Edmunds, 1974, 55, pl. 12 fig. 140-141 (egg); McCafferty, 1975, 101:451, fig. 1 (nymph); Edmunds, Jensen & Berner, 1976, p:276, fig. 42, 197, 202, 204, 424 (male, female, nymph); Berner, 1977, 22(1):48; Peters & Peters, 1977, 62:409; Tshernova, 1977, 1977:95; Soldán, 1979, 72:636, fig. 1-15 (male, female, nymph); Tsui & Hubbard, 1979, 67:119; Finn & Herlong, 1980, 91:102; Harvey, Vannote & Sweeney, 1980, p:211; Dakin & Felder, 1981, 64:454; Peters, 1982, 6:28; Sweeney & Vannote, 1982, 36:811; Basha & Pescador, 1984, p:205; Benke et al., 1984, 54:43; Fink, 1986, p:1; Peters & Peters, 1986, 69:245, fig. 1-3 (male, female); Peters, Peters & Fink, 1987, 65:3177; Berner & Pescador, 1988, p:259, pl. 14, fig. 14 (male, female, nymph, egg); Fink & Yasui, 1988, 17:448, fig. 1-9 (sperm); Peters & Peters, 1988, 97(5):8, 3 figs (male); Kluge, 1989, pl. 5 fig. 2 (nymph); Jacobs, 1990, 101:219; Fink, Soldán, Peters & Peters, 1991, 69:1083, fig. 3a-g, 6a-j, 7a-d (nymph); Peters & Gillies, 1991, p: fig. 8, 10-11 (male); Sweeney & Funk, 1991, 13:17; Peters & Peters, (in press).

Distribution: United States (Florida, Georgia, Louisiana, North Carolina, South Carolina, Wisconsin-Minnesota).

***Dolania* sp.**

Dolania sp. nov.; Sweeney & Funk, 1991, 13:18.

Distribution: United States (Alabama).

Genus *Protobehningia* Tshernova

Protobehningia Tshernova in Tshernova & Bajkova, 1960, 39:411; Peters & Peters, 1977, 62:410; Soldán, 1979, 72:636; Landa & Soldán, 1985, 4:99; Tshernova et al., 1986, 1:111; Peters & Peters, 1986, 69:246; Peters & Gillies, 1991, p:207.

Type-species: *Protobehningia asiatica* Tshernova, original designation.

***Protobehningia asiatica* Tshernova**

Protobehningia asiatica Tshernova in Tshernova & Bajkova, 1960, 39:413, fig. 1-3 (nymph); Peters & Peters, 1977, 62:410; Tshernova, 1977, 1977:95; Tiunova, 1986, p:21; Tshernova et al., 1986, 1:111; Kluge, 1989, pl. 5 fig. 1 (nymph); Peters & Gillies, 1991, p:207, fig. 7 (nymph).

Distribution: Far Eastern Russia.

***Protobehningia merga* Peters & Gillies**

Protobehningia merga Peters & Gillies, 1991, p:208, fig. A, 1-6 (male, nymphal exuviae).

Distribution: Thailand.

Key to the imagos of Behningiidae

(portions adapted from Peters & Gillies 1991)

1. Vein CuA of fore wings not forked; length of penes 3/5 to 4/5 length of abdomen *Protobehningia* (*Protobehningia merga*)
- Vein CuA of fore wings forked; length of penes 1/4 length of abdomen or less 2
- 2(1). Longitudinal veins form geminate pairs in fore wings; length of forceps nearly as long as length of penes *Behningia*, 3
- Longitudinal veins evenly spaced in fore wings; length of forceps 1/2 length of penes. *Dolania americana*
- 3(2). One longitudinal intercalary vein in fork of CuA₁ of fore wings (see Edmunds and Traver, 1959, fig. 24) 4
- Two longitudinal intercalary veins in fork of CuA₁ of fore wings *Behningia ulmeri*
- 4(3). Intercalary reticulations along hind margin of fore wings *Behningia lestagei*
- No intercalary reticulations along hind margin of fore wings *Behningia tshernovae*

Key to the nymphs of Behningiidae

1. Tarsi of fore legs fused to tibiae; tibiae of hind legs not reduced *Protobehningia*, 5
- Tarsi of fore legs not fused to tibiae; tibiae of hind legs reduced 2
- 2(1). Labial palp III less than $\frac{4}{5}$ length of palp II; galea-lacina of maxilla ovoid *Behningia*, 3
- Labial palp III subequal to longer than palp II; galea-lacina of maxilla not ovoid *Dolania americana*
- 3(2). Labial palp II at least $\frac{2}{3}$ as long as palp III *Behningia ulmeri*
- Labial palp II less than $\frac{2}{3}$ as long as palp III 4
- 4(3). Labial palp I subequal in length to palp III; labial palp I more than twice as long as broad *Behningia tshernovae*
- Labial palp I about $\frac{1}{20}$ length of palp III; labial palp I less than twice as long as broad *Behningia lestagei*
- 5(1). Glossae and paraglossae with few (<5) long stout setae on ventral surface *Protobehningia asiatica*
- Glossae and paraglossae with more than 20 long stout setae on ventral surface *Protobehningia merga*

ACKNOWLEDGMENTS

I thank Janice G. Peters, Department of Entomology, Florida A&M University, for her helpful comments.

LITERATURE CITED

- Basha, S. M. & M. L. Pescador. 1984. Protein composition of the different life stages of *Dolania americana* (Ephemeroptera, Behningiidae). Pp. 205–211 In: V. Landa, T. Soldán & T. Tonner (eds.), Proceedings of the Fourth International Conference on Ephemeroptera. Institute of Entomology, Czechoslovak Academy of Sciences, České Budějovice.
- Behning, A. 1924. Zur Erforschung der am Flussboden der Wolga lebenden Organismen (in Russian). Monographien, der Biologischen Wolga-Station der Naturforscher-Gesellschaft zu Saratow (1924) 1(4):121–289.
- Benke, A. C., T. C. van Arsdall, Jr., D. M. Gillespie & F. K. Parrish. 1984. Invertebrate productivity in a subtropical blackwater river: The importance of habitat and life history. Ecological Monogr. 54:25–63.
- Berner, L. 1977. Distributional patterns of southeastern mayflies (Ephemeroptera). Bulletin of the Florida State Museum (Biological Sciences) 22(1):1–55.
- Berner, L. & M. L. Pescador. 1988. The Mayflies of Florida. Revised Edition. Univ. Presses of Florida, Gainesville. 415 pp.
- Bertrand, H. 1954. Les éphéméroptères. Pp. 215–266 In: Les Insectes Aquatiques d'Europe. Paul Lechevalier, Paris. Vol. 1.
- Brodsky, A. K. 1974. [Evolution of the flight apparatus of Ephemeroptera] (in Russian). Entomologicheskoe Obozrenie 53:291–303.
- Dakin, M. E., Jr. & D. L. Felder. 1981. A record of the mayfly *Dolania americana* in Louisiana (Ephemeroptera: Behningiidae). Florida Entomologist 64:454–455.
- Demoulin, G. 1952. Les *Behningia Lestage* 1929, et leur position dans la classification des Ephémères. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique 28(21):1–15.
- _____. 1955. A propos de la position ventrale des trachéobranchies chez la larve des Behningiidae (Ephemeroptera). Bulletin et Annales de la Société Royale Entomologique de Belgique 91:207–208.
- Edmunds, G. F., Jr. 1962. The type localities of the Ephemeroptera of North America north of Mexico. Univ. of Utah Biological Series 12(5):1–39.

- Edmunds, G. F., Jr., S. L. Jensen & L. Berner. 1976. The Mayflies of North and Central America. Univ. of Minnesota Press, Minneapolis. x + 330 pp.
- Edmunds, G. F., Jr. & J. R. Traver. 1959. The classification of the Ephemeroptera. I. Ephemeroidea: Behningiidae. *Ann. Entomol. Soc. America* 52:43-51.
- Fink, T. J. 1986. The reproductive life history of the predacious, sand-burrowing mayfly *Dolania americana*, Ph.D. Dissertation, Florida State Univ., Tallahassee. 150 pp.
- Fink, T. J. & L. S. Yasui. 1988. Ultrastructure of the sperm of *Dolania americana* Edmunds and Traver (Ephemeroptera: Behningiidae). *International Jour. of Insect Morphology and Embryology* 17:447-454.
- Fink, T. J., T. Soldán, J. G. Peters & W. L. Peters. 1991. The reproductive life history of the predacious, sand-burrowing mayfly *Dolania americana* (Ephemeroptera: Behningiidae) and comparisons with other mayflies. *Canadian Jour. of Zoology* 69:1083-1093.
- Finn, P. L. & D. D. Herlong. 1980. New distributional record of *Dolania americana* (Ephemeroptera: Behningiidae). *Entomol. News* 91:102-104.
- Harvey, R. S., R. L. Vannote & B. W. Sweeney. 1980. Life history, developmental processes, and energetics of the burrowing mayfly *Dolania americana*. Pp. 211-230 *In*: J. F. Flannagan & K. E. Marshall (eds.), *Advances in Ephemeroptera Biology*, Plenum Press, New York.
- Hubbard, M. D. 1979. Genera and subgenera of Recent Ephemeroptera. *Eatonia Supplement* no. 2:1-8.
- _____. 1982a. Catálogo abreviado de Ephemeroptera da América do Sul. *Papéis Avulsos de Zoologia* 34:257-282.
- _____. 1982b. Catalog of the Ephemeroptera: Family-group taxa. *Aquatic Insects* 4:49-53.
- _____. 1986. A catalog of the mayflies (Ephemeroptera) of Hong Kong. *Insecta Mundi* 1: 247-254.
- _____. 1987. Ephemeroptera. *Fossilium Catalogus. I: Animalia. Pars* 129. iii + 99 pp.
- _____. 1990. Mayflies of the World: A Catalog of the Family and Genus Group Taxa. *Flora & Fauna Handbook* no. 8. Sandhill Crane Press, Gainesville, Florida. viii + 119 p.
- Hubbard, M. D., E. Dominguez & M. L. Pescador. 1992. Los Ephemeropteros de la República Argentina: Un Catálogo. *Revista de la Sociedad Entomológica Argentina* 50:201-240.
- Hubbard, M. D. & M. L. Pescador. 1978. A catalog of the Ephemeroptera of the Philippines. *Pacific Insects* 19:91-99.
- Hubbard, M. D. & W. L. Peters. 1978. A catalogue of the Ephemeroptera of the Indian Subregion. *Oriental Insects Supplement* 9:1-43.
- Hubbard, M. D. & H. M. Savage. 1981. The fossil Leptophlebiidae (Ephemeroptera): A systematic and phylogenetic review. *Jour. of Paleontology* 55:810-813.
- Jacobs, W. L. 1990. A new distributional record for the sand-burrowing mayfly *Dolania americana* (Ephemeroptera: Behningiidae). *Entomol. News* 101:219-221.
- Kaludina, N. C. 1980. [Insects of past aquatic ecosystems] (in Russian). Pp. 224-240 *In*: B. B. Rohdendorf and A. P. Rasnitsin (eds.), *Istoricheskoe Razvitiye Klassa Nasekomikh. Trudi Paleontologicheskogo Instituta Akademiyi Nauk SSSR*, T. 178.
- Keffermüller, M. 1957. Kilka rzadkich w Polsce gatunków jętek (Ephemeroptera). *Fragmenta Faunistica* 7:253-262.
- _____. 1959. Nowe dane dotyczące jętek (Ephemeroptera) z rodzaju *Ametropus* Alb. i *Behningia* Lest. *Prace Komisji Biologicznej Poznańskie Towarzystwo Przyjaciół-Nauk, Wydział-Matematyczno-Przyrodniczy* 19(5):1-32.
- _____. 1960. Badania nad fauna jętek (Ephemeroptera) Wielkopolski. *Prace Komisji Biologicznej Poznańskie Towarzystwo Przyjaciół-Nauk, Wydział-Matematyczno-Przyrodniczy* 19(8):1-57, pl. 1-11.
- _____. 1963. Masowy lot Beningii (*Behningia lestagei* Motaş et Băcesco, Ephemeroptera) w Ostrowsku nad Warta. *Badania Fizjograficzne nad Polska Zachodnia* 12:323-325.
- Kluge, N. Yu. 1989. [A question of the homology of the tracheal gills and paranotal processes of mayfly larvae and wings of insects with reference to the taxonomy and phylogeny of the order mayflies (Ephemeroptera)] (in Russian). Pp. 48-77 *In*: *Doklady na Sorok Pervom Ezhegodnom Chtenii Pamyati N. A. Kholodkovskogo, Akademi Nauk SSSR*.

- Klyutschareva, O. A. 1963. [On downstream and diurnal vertical migrations of benthic invertebrates in the Amur] (in Russian). *Zoologicheskii Zhurnal* 42:1601-1612.
- Koss, R. W. & G. F. Edmunds, Jr. 1974. Ephemeroptera eggs and their contribution to phylogenetic studies of the order. *Zoological Jour. of the Linnean Society* 55:267-349, pl. 1-24.
- Landa, V. 1969. Jepice-Ephemeroptera. *Fauna CSSR* 18:1-352.
- Landa, V. & T. Soldán. 1985. Phylogeny and higher classification of the order Ephemeroptera: a discussion from the comparative anatomical point of view. *Studie ČSAV, Československa Akademie Věd., Praha*. 121 p.
- Lestage, J. A. 1930. Contribution ! l'étude des larves des Ephéméroptères. V. Les larves ! trachéo-branchies ventrales. *Bulletin et Annales de la Société Entomologique de Belgique* 69:433-440.
- _____. 1938. Contribution ! l'étude des Ephéméroptères. XIX. L'inclusion des Behningiidae parmi les Oligoneuriidae. *Bulletin et Annales de la Société Entomologique de Belgique* 78:315-319.
- McCafferty, W. P. 1975. The burrowing mayflies (Ephemeroptera: Ephemeroidea) of the United States. *Trans. Amer. Entomol. Soc.* 101:447-504.
- _____. 1979. Evolutionary trends among the families of Epermeroidea. Pp. 45-50 *In*: K. Pasternak & R. Sowa, (eds), *Proceedings of the Second International Conference on Ephemeroptera*. Państwowe Wydawnictwo Naukowe, Warszawa-Kraków.
- _____. 1991. Toward a phylogenetic classification of the Ephemeroptera (Insecta): A commentary on systematics. *Ann. Entomol. Soc. America* 84:343-360.
- McCafferty, W. P. & G. F. Edmunds, Jr. 1979. The higher classification of the Ephemeroptera and its evolutionary basis. *Ann. Entomol. Soc. America* 72:5-12.
- Motaş, C. & M. Băcesco. 1937. Le découverte en Roumanie d'une nymphe d'Ephémère appartenant au genre *Behningia* J. A. Lestage 1929. *Annales Scientifiques de l'Université de Jassy, Seconde Partie*, 24:25-29.
- _____. 1940. Notes complémentaires sur la nymphe de *Behningia lestagei* Motaş 1937, trouvée en Roumanie. *Annales Scientifiques de l'Université de Jassy, Seconde Section* 26:78-90.
- Peters, J. G. & W. L. Peters. 1986. Leg abscission and adult *Dolania* (Ephemeroptera: Behningiidae). *Florida Entomol.* 69:245-250.
- _____. (in press). Evidence for a dispersal morph in females of *Dolania americana* (Ephemeroptera: Behningiidae). *Proceedings of the VIIth International Conference on Ephemeroptera*, Sandhill Crane Press, Gainesville, Florida.
- Peters, J. G., W. L. Peters & T. J. Fink. 1987. Seasonal synchronization of emergence in *Dolania americana* (Ephemeroptera: Behningiidae). *Canadian Jour. of Zoology* 65:3177-3185.
- Peters, W. L. 1982. Phylum Arthropoda: Class Insecta: Order Ephemeroptera. Pp. 28-31 *In*: R. Franz, *Rare and Endangered Biota of Florida*. Vol. 6. Invertebrates. Florida Game and Fresh Water Fish Commission, Univ. Presses of Florida, Gainesville.
- Peters, W. L. & J. Jones. 1973. Historical and biological aspects of the Blackwater River in northwestern Florida. Pp. 242-253, 3 pl. *In*: W. L. Peters & J. G. Peters (eds.), *Proceedings of the First International Conference on Ephemeroptera*. E. J Brill, Leiden.
- Peters, W. L. & M. T. Gillies. 1991. The male imago of *Protobehningia* Tshernova from Thailand (Ephemeroptera: Behningiidae). Pp. 207-216 *In*: J. Alba-Tercedor & A. Sanchez-Ortega (eds.), *Overview and Strategies of Ephemeroptera and Plécoptera*. Sandhill Crane Press, Inc., Gainesville, Florida.
- Peters, W. L. & J. G. Peters. 1977. Adult life and emergence of *Dolania americana* in northwestern Florida (Ephemeroptera: Behningiidae). *Internationale Revue der Gesamten Hydrobiologie* 62:409-438.
- _____. 1988. The secret swarm. *Natural History* 97(5):8, 10, 12-13.
- Poprawska, U. 1960. Jętki (Ephemeroptera) rezerwatu Krajkowo nad Wartą (Pow. Poznański). *Ephemeroptera [sic] in the Reserve of Krajkowo on Warta-River (province Poznań)*. *Przyroda Polski Zachodniej* 4:156-162.

- Putzh, V. 1978. Ephemeroptera, p. 256-263, *In*: J. Illies (ed.), *Limnofauna Europaea*. 2nd ed. Gustav Fischer, Stuttgart.
- Schneider, R. F. 1966. Mayfly nymphs from northwestern Florida. *Quart. Jour. Florida Academy of Sciences* 29:202-206.
- Sinitshenkova, N. D. 1984. The Mesozoic mayflies (Ephemeroptera) with special reference to their ecology. Pp. 61-66 *In*: V. Landa, T. Soldán & M. Tonner, eds., *Proceedings of the Fourth International Conference on Ephemeroptera*, Czechoslovak Academy of Sciences.
- _____. 1985. [Jurassic mayflies (Ephemera-Ephemeroptera) of southern Siberia and western Mongolia] (in Russian). *Jurskie Nasekomye Sibiri i Mongolii. Trudi Paleontologicheskogo Instituta* 211:11-23, pl. 1-2.
- Soldán, T. 1979. Internal anatomy of *Dolania americana* (Ephemeroptera: Behningiidae). *Ann. Entomol. Soc. America* 72:636-641.
- Sweeney, B. W. & D. H. Funk. 1991. Population genetics of the burrowing mayfly *Dolania americana*: Geographic variation and the presence of a cryptic species. *Aquatic Insects* 13:17-27.
- Sweeney, B. W. & R. L. Vannote. 1982. Population synchrony in mayflies: a predator satiation hypothesis. *Evolution* 36:810-821.
- Tiunova, T. M. 1986. [Mayflies (Ephemeroptera) of the Far Eastern USSR] (in Russian). Pp. 14-34 *In*: [Annotated Catalog: Caddisflies (Trichoptera) and Mayflies (Ephemeroptera) of the Far Eastern USSR; Supplemental Appendix to "Bottom Organisms of Freshwaters of the Far East" (Vladivostok, 1986). Akademiya Nauk SSSR, Vladivostok.
- Tshernova, O. A. 1938. [Novoe semeistvo podenok (Ephemeroptera)] (in Russian). *Izvestiya Akademii Nauk SSSR* 1938:129-137.
- _____. 1940. [Podenki (Ephemeroptera)] (in Russian). *Zhizi Presnikh Vod SSSR* 1:127-137.
- _____. 1952. [Mayflies of the Amur River Basin and nearby waters and their role in the nutrition of Amur fishes] (in Russian). *Trudi Amurskoi Ikhtologicheskoi Ekspeditsii* 1945-1949 gg. 3:229-360, 2 tab.
- _____. 1958. [The geographical distribution of Ephemeroptera and some peculiar features of the fauna of the Amur Basin] (in Russian). *Entomologicheskoe Obozrenie* 37:64-84.
- _____. 1977. [Distinctive new mayfly nymphs (Ephemeroptera; Palingeniidae, Behningiidae) from the Jurassic of Transbaikal] (in Russian). *Paleontologicheskii Zhurnal* 1977:91-96, 1 pl.
- _____. 1980. [Cohort Ephemeraformes Latreille, 1810] (in Russian). Pp. 30-36, Tab. 1, fig. 2-3, *In*: B. B. Rohdendorf and A. P. Rasnitsin (eds.), *Istoricheskoe Razvitie Klassa Nasekomikh. Trudi Paleontologicheskogo Instituta Akademii Nauk SSSR*, T. 178.
- Tshernova, O. A. & O. Ya. Bajkova. 1960. [On a new genus of mayflies (Ephemeroptera, Behningiidae)] (in Russian). *Entomologicheskoe Obozrenie* 39:410-416.
- Tshernova, O. A., N. Yu. Klyuge, N. D. Sinitshenkova & V. V. Belov. 1986. [Order Ephemeroptera - Mayflies] (in Russian). Pp. 99-142 *In*: *Opredelitel Nasekomikh Dalnego Vostok SSSR* vol. 1.
- Tsui, P. T. P. & M. D. Hubbard. 1979. Feeding habits of the predaceous nymphs of *Dolania americana* in northwestern Florida (Ephemeroptera: Behningiidae). *Hydrobiologia* 67:119-123.
- Ulmer, G. 1924. Eine Merkwürdige Ephemeriden-Nymphe aus der Wolga. *Rabot Volzhskoi Biologicheskoi Stantsii -Arbeiten der Biologischen Wolga-Station* 7(3):1-8.