

NOMENCLATURE
NOTES

***Annulina* M.F. Neuburg: Illegitimate Generic Name Replaced
by *Umbellaphyllites* Rasskazova, 1961 (Equisetophyta)**

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Abstract—A taxonomic revision of the fossil equisetophyte genera showed that the generic name *Annulina* proposed by Neuburg in 1954 did not meet the requirements of the International Code of Botanical Nomenclature (ICBN) (see Greuter *et al.*, 2000) and, therefore, was invalidly published until substantiation by Rasskazova (1961b). However, the generic name *Annulina* is preoccupied by the green algae *Annulina* Link (Chlorophyceae: Cladophoraceae) (Link, 1820). Therefore, the generic name established for the fossil genus of the Equisetophyta is replaced by *Umbellaphyllites*.

INTRODUCTION

Studying Angara equisetophytes, Meyen (1971) noted a large similarity between the genera *Annulina* and *Umbellaphyllites* Rasskazova (1961a) and tried to unite these taxa formally. However, he did not follow all the requirements of the ICBN for the procedure of combination, and his proposals remained invalid. Additionally, the genus *Umbellaphyllites* was published by Rasskazova earlier (after May 5, 1961) than the validating description of the genus *Annulina* (after July 10, 1961), and, therefore, Meyen's proposal to treat these two genera as congeneric under the name *Annulina*, which is a junior synonym, was illegitimate. Taking into account the revealed homonymy of the equisetophyte generic name *Annulina* M.F. Neuburg ex Rasskazova with that of green algal, the generic name *Umbellaphyllites* is the only valid generic name that should be applied to the equisetophytes previously placed in the genus *Annulina*.

Meyen (1971) assigned the plants described by Radczenko (Gorelova and Radczenko, 1962) as the genus *Gamophyllites* G. Radczenko to the genus *Annulina* as well. Simultaneously, he proposed new combinations but did not validated according to the ICBN rules. Sharing Meyen's point of view on the validity of fusion of *Umbellaphyllites*, *Annulina*, and *Gamophyllites* into one genus, we transferred all but three species described in these genera to the genus *Umbellaphyllites*. The lectotypification of heterogeneous type material on the species *Gamophyllites stenophylloides* Verbitskaja, which was erroneously treated by Meyen (1971) as invalidly published species name, allowed the attribution of this species to the genus *Phyllotheca* with certainty. Two Australian species of the genus *Umbellaphyllites*, *U. minimus* J.F. Rigby and *U. ivinii* (Walkom) J.F. Rigby, in spite of some similarity to the genus *Umbellaphyllites*, should be assigned to the genus *Raniganjia* D.D. Pant et Nautiyal (Pant and Nautiyal, 1967; Meyen, 1971) based on the assemblage of

all shoot characters. Below, is a brief review of the genus *Umbellaphyllites* Rasskazova emend. Doweld with due regard for the validization of all proposed changes in its composition.

SYSTEMATIC PALEONTOLOGY

DIVISIO EQUISETOPHYTA
D.H. SCOTT, 1900

CLASS EQUISETOPSIDA
C. AGARDH, 1825

Order Gondwanostachyales Doweld, 2001

Family Tschernoviaceae S.V. Meyen, 1983

Genus *Umbellaphyllites* Rasskazova,
[May 5] 1961a, p. 54, emend. Doweld. =

Annulina M.F. Neuburg ex Rasskazova, [July 11] 1961b, p. 56–57 (non H. Link, 1820, p. 4). = *Gamophyllites* G. Radczenko [in Gorelova et G. Radczenko], 1962, p. 62.

Type species. *Umbellaphyllites annularioides* Rasskazova, 1961a, p. 55, pl. 3, figs. 1–5; text-figs. 2–3. = *Annulina annularioides* (Rasskazova) S.V. Meyen, 1971, p. 26, nom invalid. Holotype: IGN, no. 1764/3087, Tunguska basin, right bank of the Nizhnyaya Tunguska River; Burgukli Formation (pl. 3, fig. 2).

The genus includes eight species:

(1) *Umbellaphyllites annularioides* Rasskazova.

(2) *Umbellaphyllites iljinskiensis* (G. Radczenko) Doweld, comb. nov. = *Gamophyllites iljinskiensis* G. Radczenko [in Gorelova et G. Radczenko], 1962, p. 64, pl. 5, figs. 1–3; pl. 6, figs. 1 and 2. Holotype: TsNIGR Museum, no. 6/4898, Kuznetsk basin; Upper Balakhonka Formation.

(3) *Umbellaphyllites longifolius* (Gorelova) Doweld, comb. nov. = *Gamophyllites longifolius* Gorelova [in Gorelova, Menshikova, et Khalfin], 1973, pp. 83–84, pl. 12, figs. 1–3. Holotype: Museum of Zapsibgeolupravlenie, no. 1/244, Kuznetsk basin, right bank of the Usa River, upstream of the Ol'zheras River mouth; Upper Permian (pl. 12, fig. 1).

(4) *Umbellaphyllites neuburgianus* (G. Radczenko) Doweld, comb. nov. = *Annularia neuburgiana* G. Radczenko, 1934, pp. 16–17, pl. 4, figs. 1–7; pl. 7, figs. 1, 2, and 6. = *Annulina neuburgiana* (G. Radczenko) M.F. Neuburg ex Rasskazova, 1961b, pp. 56–57. Lectotype (Rasskazova, 1961b, p. 57): IGN, no. 1742/3087, Nizhnaya Tunguska River, outcrop Shcheki; Burgukli Formation¹ = *Annulina syrjagensis* M.F. Neuburg, 1964, pp. 64–65, pl. 36, figs. 2 and 3. Holotype: GIN, no. 3040/97, Pechora River basin, right bank of the Syr'-Yaga River; Upper Permian.

(5) *Umbellaphyllites planifolius* (G. Radczenko) Doweld, comb. nov. = *Annularia planifolia* G. Radczenko, 1956, p. 178, pl. 34, fig. 7; pl. 35, figs. 1 and 2 = *Annulina planifolia* (G. Radczenko) G. Radczenko [in Eliseeva et Radczenko], 1964, p. 42, nom. invalid. Lectotype (designated here): G. Radczenko, 1956, pl. 34, fig. 7 [the holotype and the place of its storage are not indicated in the protologue].²

Umbellaphyllites planifolius f. *crassinervia* G. Radczenko ex Doweld, f. nov. = *Annulina planifolia* f. *crassinervia* G. Radczenko ex Burago, 1979, p. 58, pl. 6, figs. 3 and 4; pl. 9, fig. 2, nom. invalid. Holotype: Primorskoe Terr. Geol. Upravlenie, no 2028/17, Primorie Region, Tsaev Creek, right tributary of the Litovka River; Lower Permian, Abrek Formation (Burago, 1979, p. 58, pl. 6, figs. 3 and 4; pl. 9, fig. 2).

Diagnosis. A species proxima *Gamophyllito tenuifolio* costa crassior et valde excurrente, foliis in verticillis pluris (18–24) differt. Caules costulati, internodiis abbreviatis; folia magna, 17–47 mm longa, 3–6 mm lata, oblongo-lanceolata, versus apicem acutum et basin cuneatim sensim angustata, basi concretescentes et breviam vaginam formantes, in verticillis 18–24; costa crassa, distincta, longitudinale-striata; striatio laminae foliis valde distincta (after Burago, 1979, p. 58).

(6) *Umbellaphyllites tchumyshensis* (Gorelova) Doweld, comb. nov. = *Gamophyllites tchumyshensis* Gorelova [in Gorelova, Menshikova, et Khalfin], 1973, p. 84, pl. 13, figs. 1–5. Holotype: SNIIGGIMS, no. 1/377, Kuznetsk basin, Bunguro-Chumyshskii District; Ustyatskoe Formation.

(7) *Umbellaphyllites usjatensis* (Gorelova) Doweld, comb. nov. = *Gamophyllites usjatensis* Gorelova [in Gorelova et G. Radczenko], 1962, p. 65, pl. 6, fig. 3. Holotype: TsNIGR Museum, no. 11/4989, Kuznetsk basin, village of Novo-Bachat; Upper Balakhonka Formation.

Species incertae sedis:

¹ The lectotypification of *A. neuburgiana* performed by Neuburg (1964) should be rejected as superfluous, since, earlier, Rasskazova (1961b) validly proposed the other lectotype.

² Eliseeva and Radczenko (1964) cited this species in the lists of fossil plants; however, this combination has never been published according to the requirements of the ICBN. Therefore, the form of this species f. *crassinervia* (being invalid due to the absence of the taxonomically formalized species *A. planifolia*) is validated here.

(8) *Umbellaphyllites kuschejakovensis* (Gorelova) Doweld, comb. nov. = *Gamophyllites kuschejakovensis* Gorelova [in Gorelova et G. Radczenko], 1962, pp. 65–66, pl. 7, figs. 8a–10. Holotype: Museum of Zapsibgeolupravlenie, no. 161/20, Kuznetsk Basin; Upper Balakhonka Formation.

Species excluded:

(1) *Umbellaphyllites minimus* (“*minima*”) J.F. Rigby, 1966, p. 118, pl. 31, figs. 9 and 17 = *Raniganjia minima* (J.F. Rigby) Doweld, comb. nov. Holotype: Dept. Geol. Univ. W. Australia, no. 52986, southern bank of the Irvin River (pl. 31, fig. 17) (see Meyen, 1971).

(2) *Umbellaphyllites ivinii* (“*ivini*”) (Walkom) J.F. Rigby, 1966, p. 118 = *Raniganjia ivinii* (Walkom) Doweld, comb. nov. = *Annularia ivinii* (“*ivini*”) Walkom, 1941, pp. 43–44, pl. 8, figs. 1–4. Lectotype (designated here): Walkom, 1941, pl. 8, figs. 1–4 (see Pant and Nautiyal, 1967).

(3) *Gamophyllites stenophylloides* Verbitskaja, 1968, pp. 17–18, pl. 6, figs. 1 and 2, emend. Doweld. = *Phyllothea verbitskae* Doweld, nom. nov. (non *Phyllothea stenophylloides* Zalessky, 1939, p. 332). Lectotype (designated here): TsNIGR Museum, no. 6/8269, Tunguska basin, right bank of the Taimur River near the Kerbo trading station; Isolectotype (designated here): TsNIGR Museum, no. 4/8269, the same locality.

Diagnosis. Frutices; caules aliquatenus crassi, costulati, in internodiis haud magnis partiti; folia magna, in verticillis 20–30, 1–2.5 mm lata; sensim angustata versus basi et apicem acutum; basis foliis apprimae angustata, 0.5–1.2 mm lata, coalescentes et formantes vaginam cylindricam 6–11 mm altam; costa non valde distincta.³

The species is named in honor of the famous Russian paleobotanist N.G. Verbitskaja.

REFERENCES

Burago, V.I., Early Permian Flora from the Daubikhan Zone, in *Tr. Biol.-Pochv. Inst. Dalvost. Tsen. Akad. Nauk SSSR*, 1979, vol. 53 (156), pp. 49–67.

Eliseeva, V.K. and Radczenko, G.P., Stratigraphy of the Permian Continental and Volcanic Formations of the Southern Primorie, *Tr. Vsesoyuz. Geol. Inst., Nov. Ser.*, 1964, issue 107, pp. 31–53.

Gorelova, S.G., Men'shikova, L.V., and Khalfin, L.L., Phytostратigraphy and Identification Key of Plants from the Upper Paleozoic Sediments of the Kuznetsk Basin, *Tr. Sib. Nauchno-Issled. Inst. Geol., Geofiz. Mineral. Syr'ya*, 1973, issue 140, part 1, pp. 1–169; part 2, pp. 1–116.

³ The name *Gamophyllites stenophylloides* (Zalessky) G. Radczenko, 1966, p. 450, nom. invalid., is invalid according to ICBN, since it was proposed by Radczenko without any validating references required by the ICBN rules. Therefore, Meyen's (1971) erroneous statement on the invalidity of the name *Gamophyllites stenophylloides* Verbitskaja, which was in reality published in accordance with the rules of the ICBN, cannot be accepted. After the lectotypification performed in the present paper, this taxon should be assigned to the genus *Phyllothea*, as was suggested by Meyen (1971).

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REFERENCES

- Burago, V.I., Early Permian Flora from the Daubikhan Zone, in *Tr. Biol.-Pochv. Inst. Dalvost. Tsen. Akad. Nauk SSSR*, 1979, vol. 53 (156), pp. 49–67.
- Eliseeva, V.K. and Radczenko, G.P., Stratigraphy of the Permian Continental and Volcanic Formations of the Southern Primorie, *Tr. Vsesoyuz. Geol. Inst., Nov. Ser.*, 1964, issue 107, pp. 31–53.
- Gorelova, S.G., Men'shikova, L.V., and Khalfin, L.L., Phytostратigraphy and Identification Key of Plants from the Upper Paleozoic Sediments of the Kuznetsk Basin, *Tr. Sib. Nauchno-Issled. Inst. Geol., Geofiz. Mineral. Syr'ya*, 1973, issue 140, part 1, pp. 1–169; part 2, pp. 1–116.

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- Gorelova, S.G. and Radczenko, G.P., The Most Important Late Permian Plants of the Altai-Sayan Mountain Region, *Tr. Vsesoyuz. Geol. Inst., Nov. Ser.*, 1962, issue 79, pp. 39–177.
- Greuter, W., McNeill, J., Barrie, F.R., et al., *International Code of Botanical Nomenclature (Saint Louis Code) Adopted by the Sixteenth International Botanical Congress St. Louis, Missouri, July–August 1999*, Königstein, 2000 (Regnum Veg., 138).
- Link, H., *Annulina*, in *Horae Physicae Berolinenses collectae ex symbolis virorum (...)*, part 1, Nees von Esenbeck, C.G.D., Ed., Bonn: A. Marcus, 1820, p. 4.
- Meyen, S.V., Phyllothea-like Plants from the Upper Paleozoic Flora of Angaraland, *Palaeontographica. Abt. B*, 1971, vol. 133, nos. 1–3, pp. 1–33.
- Neuburg, M.F., An Experience of Phytostratigraphical Correlation of the Upper Paleozoic of Angaraland and Lower Gondwana (India), in *Vopr. Geol. Asii*, vol. 1, Moscow: Akad. Nauk SSSR, 1954, pp. 765–797.
- Neuburg, M.F., The Permian Flora from the Pechora Basin: Part 2. Arthropphyta (Sphenopsida), *Tr. Geol. Inst. Akad. Nauk SSSR*, 1964, issue 111, pp. 1–137.
- Pant, D.D. and Nautiyal, D.D., On the Structure of *Raniganjia bengalensis* (Feistmantel) Rigby with a Discussion of Its Affinities, *Palaeontographica. Abt. B*, 1967, vol. 121, nos. 4–6, pp. 102–121.
- Radczenko, G.P., Materials to the Paleozoic Flora of the Kuznetsk Basin, *Mat. Geol. Zap. Sib.*, 1934, issue 13, pp. 3–55.
- Radczenko, G.P., Index Forms of the Upper Paleozoic Flora from the Sayan-Altai Region, in *Atlas rukovodyashchikh form iskopaemykh fauny i flory permskikh otlozhenii Kuznetskogo basseina* (Atlas of Index Forms of the Fauna and Flora from Permian Deposits of the Kuznetsk Basin), Moscow: Gosgeoltekhizdat, 1956, pp. 110–202.
- Radczenko, G.P., Terrestrial Flora and Distribution of Associations, the History of Development and Phytogeographical Zonation, in *Stratigrafiya SSSR* (Stratigraphy of the USSR), vol. 8: *Permskaya Sistema* (The Permian System), Moscow: Nedra, 1966, pp. 447–460.
- Rasskazova, E.S., Arthropphyta of the Upper Paleozoic from the Tunguska Basin, *Sborn. Stat. Paleontol. Nauchno-Issled. Inst. Geol. Arktiki*, 1961a, issue 23, pp. 35–76.
- Rasskazova, E.S., Arthropphyta of the Upper Paleozoic from the Tunguska Basin (Concluding Part), *Sborn. Stat. Paleontol. Nauchno-Issled. Inst. Geol. Arktiki* (Papers on Paleontology of the Scientific Research Institute of Arctic), 1961b, issue 24, pp. 46–73.
- Rigby, J.F., The Lower Gondwana Floras of the Perth and Collie Basins, Western Australia, *Palaeontographica. Abt. B*, 1966, vol. 118, nos. 4–6, pp. 113–152.
- Verbitskaja, N.G., *Gamophyllites stenophylloides*, in *Novye vidy drevnikh rastenii i bespozvonochnykh SSSR* (New Species of Early Plants and Invertebrates of the USSR), vol. 2, part 1, Moscow: Nedra, 1968, pp. 17–18.
- Walkom, A.B., On a New Species of Annularia, *Rec. Austr. Mus.*, 1941, vol. 21, no. 1, pp. 43–44.
- Zalessky, M.D., Végétaux pérmien du Bardien de l'Oural, *Probl. Paleontol.*, 1939, vol. 5, pp. 329–374.