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On the systematics of *Sylvenomyia* Mamaev & Zaitzev (Diptera, Cecidomyiidae, "Porricondylinae"), with the description of a new species from Finland

JOUNI PENTTINEN[1] & MATHIAS JASCHHOF[2]

[1]*Lamminmutka 2 C13, FI-40520 Jyväskylä, Finland. E-mail: jouni.k.penttinen@gmail.com*
[2]*Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF), Deutsches Entomologisches Institut, Eberswalder Strasse 84, D-15374 Müncheberg, Germany. E-mail: mjaschhof@yahoo.de*

Abstract

Sylvenomyia fennica **sp. n.**, the second species of the genus *Sylvenomyia* Mamaev & Zaitzev is described from Finland. *Sylvenomyia sueciae* Mamaev & Zaitzev, the type species, is a new junior synonym of *Chastomera spinigera* Spungis. *Sylvenomyia spinigera* (Spungis) comb. n. is redescribed. The generic concept and systematic position of *Sylvenomyia* is reviewed. The genus *Sylvenomyia* is transferred from the tribe Winnertziini to the "Porricondylinae" *incertae sedis*.

Key words: taxonomy, Porricondylinae, *Sylvenomyia*, new species, Fennoscandia

Introduction

The genus *Sylvenomyia* was introduced by Mamaev and Zaitzev (1998) for *Sylvenomyia sueciae*, a new species based on two male specimens collected in south Sweden. Mamaev and Zaitzev did not convey which of the features of *Sylvenomyia* they considered diagnostic and why they assigned this genus to the tribe Winnertziini. Their key to the genera of Winnertziini employs characters of the female, which for *Sylvenomyia* are unknown, and suggests *Sylvenomyia* males have 12 antennal flagellomeres, whereas we found they have 11. Apart from these shortcomings the original description includes the figure of a wing (Mamaev & Zaitzev 1998: fig. 1b), which, even though not correct with respect to some details, eventually set us on the right track in clarifying the identity of *Sylvenomyia sueciae*. A key feature of *Sylvenomyia* is the costa, strictly speaking the strong anterior portion of it, that extends beyond the fifth radial branch (Fig. 1A). While working on the identification of porricondylines that we collected recently in various parts of Fennoscandia, we found several more specimens of *Sylvenomyia sueciae* and those of a closely related species, *Sylvenomyia fennica* **sp. n.** The peculiar adult morphology of *Sylvenomyia* prompted us to search for their relatives and review their current position within the classification of the "Porricondylinae" (Gagné 2004), which are long known to be a paraphyletic grouping (Panelius 1965). The results of our analysis are presented here, along with the descriptions of the taxa in question.

Material and methods

Our specimens of *Sylvenomyia* spp. were collected by hand, by Malaise traps and by trunk-emergence traps (Penttinen *et al*. 2007) during the years 2004 and 2005 in Russian Karelia and in different parts of Finland, in the Finnish biogeographical provinces of Satakunta (*St*), Tavastia australis (*Ta*), Tavastia borealis (*Tb*), Savonia borealis (*Sb*), Karelia borealis (*Kb*), Ostrobottnia borealis (*Ob*), Ostrobottnia kajanensis (*Ok*) and Lapponia kemensis (*Lk*). For light microscope study, specimens were dehydrated and mounted on glass slides

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in Euparal, or were embedded in Canada balsam following the procedure by Jaschhof (1998). A part of the specimens were dissected. Drawings were made by means of an Olympus BX50 microscope in combination with the U-DA drawing unit. Morphological terminology follows that by Søli (1997), or is explained elsewhere in this paper. The holotype of *Chastomera spinigera* Spungis we obtained on loan from the insect collections of the Faculty of Biology, University of Latvia, Salaspils.

Taxonomy

Genus *Sylvenomyia* Mamaev & Zaitzev 1998

Mamaev & Zaitzev 1998: 211.
Type species: *Sylvenomyia sueciae* Mamaev & Zaitzev 1998 [= *Chastomera spinigera* Spungis 1985].

Diagnosis. The strong anterior portion of C (antC) extends clearly beyond R5 and is followed by a costal break; M and CuA1 are absent (Fig. 1A). The antennae in males have 11 flagellomeres; the flagellomere nodes bear crenulate whorls of sensory hairs and hair-shaped translucent sensilla (Fig. 2A). The gonostylus bears a strong apical claw (Figs 1B, 2B, C). The simple, small tegmen is largely membranous and of broad-conical shape (Figs 1D, 2C). Females and preimaginal stages of *Sylvenomyia* spp. are unknown.

Description. Head. Occiput with short setae. Postocular bristles absent. One pair of large top setae (see Panelius 1965). Postfrons convex, bilobate, asetose. Prefrons large, asetose. Eye bridge up to 4 ommatidia long. Remnants of larval stemmata not discernible. Antennal scape and pedicel subequal in size; scape setose ventrally; pedicel asetose; 11 flagellomeres, the 2 apical flagellomere fused; flagellomere nodes longer than necks, barrel-shaped, fully covered with microtrichia, 1 whorl of basal setae, 1 complete and 1–2 incomplete crenulate whorls of long sensory hairs, several hair-shaped translucent sensilla distally (Fig. 2A). Clypeus smaller than prefrons, projecting in lateral profile, with large setae. Maxillary palpus long, 4-segmented, setae long and curved or short and straight; first segment with hair-shaped translucent sensilla.

Thorax. Pronotum asetose. Scutum with sparse dorsocentral and lateral setae. Pleural setae absent. A portion in between laterotergite and mediotergite covered with strikingly large microtrichia. **Wing** (Fig. 1A). Comparatively short and broad, about as long as body. Membrane covered with microtrichia and setae. AntC extending clearly beyond R5, followed by break; Sc long, evanescent apically; h absent; Rs with vertical rather than horizontal inclination; r-m + m-cu horizontal, in juxtaposition with R5; M and CuA1 absent; CuA2 slightly curved, weak or evanescent apically; CuP short, running very close to CuA2; 1 branch of A present, albeit short; dorsal setae present on Sc basally, stem vein, R, R1, R5, and CuA2; ventral setae absent. Pattern of sensory buds: R1, 2 distal; R5, 1 basal, 2 distal; further 1 mesal sensory bud on Sc. Halter comparatively short, stem and node subequal in length. **Legs.** Foreleg slightly longer than body, femur shorter than tibia, tibia shorter than tarsus; first segment of foretarsus 1/3 the length of second segment, with short, blunt apical projection. Pretarsal claws slightly curved, with minute teeth at midlength. Empodia vestigial.

Abdomen. All sclerites covered sparsely with large setae. Pattern of tergal plaques not fully resolved, presumably 0/2/2/1/1/1/1/0. **Terminalia** (Figs 1B, C, 2B–D)**.** St9 not traceble. Tg9 subtrapezoid, with straight apical margin. Gonocoxites with deep ventral emargination extending beyond midlength; ventral bridge membranous; posterior portion of gonocoxal apodeme (postGA) long, extending to ventrobasal gonocoxal margin; anterior portion of gonocoxal apodeme (antGA) moderately long; dorsal transverse bridge unsclerotized. Gonostylus slightly tapered towards apex, with strong, multipointed apical claw. Ejaculatory apodeme as long as gonocoxites, strongly sclerotized, with membranous, tulip-shaped cap apically. Ducts of accessory glands distinctive. Tegmen small, largely membranous, broad-conical, rounded apically, ventrolateral margins serrate or with scaly surface, apex weak, parameral apodemes directed ventroanteriorly. St10 weak, bilobate, pubescent, asetose. Cerci not or not much extending beyond tg9, setose.

Systematic position. Mamaev and Zaitzev (1998) classified *Sylvenomyia* with the Winnertziini, a decision presumably influenced by the wing venation, the presence in males of less than 14 flagellomeres, and the simple, hair-shaped antennal sensilla. On first sight, this classification seems plausible and supported by further features, such as the absence of pleurothoracal setae and the *Winnertzia*-like male terminalia, i.e. the gonostyli equipped with an apical claw and the parameres fused to form a simple, membranous tegmen. However, several other features of *Sylvenomyia* are not known from *Winnertzia* or other Winnertziini: an asetose pedicel, crenulate whorls of sensory hairs, hair-shaped translucent sensilla on the maxillary palpus, and an asetose pronotum. Also, the first tarsal segments in *Sylvenomyia* are longer than those in the other porricondylines known to us, with the exception of some Heteropezini. A unique feature of *Sylvenomyia* is antC extends beyond R5, whereas the apices of these two veins are confluent in the other porricondylines with a costal break. In Heteropezini, which lack the costal break, the costa is gradually narrowed near the apex of the wing. Altogether, there is little support for *Sylvenomyia* being correctly placed among the Winnertziini. An affiliation of *Sylvenomyia* to the Heteropezini would also be inappropriate, because the heteropezine imago is variously degenerated (Wyatt 1967), unlike the imago in *Sylvenomyia*. The Diallactini, with 14 male flagellomeres, cannot accommodate *Sylvenomyia* either. We do not see a better solution than leaving *Sylvenomyia* unplaced to any tribe for the time being.

As regards the Cecidomyiidae other than “Porricondylinae”, sylvenomyias bear an uncanny resemblance to Lestremiinae. If the first tarsal segments were longer than the second segments – the feature that unfailingly separates Lestremiinae from “Porricondylinae” and Cecidomyiinae – then sylvenomyias could be considered lestremiines. A venation pattern similar to that in *Sylvenomyia* is known from some unusual lestremiines classified with the tribe Strobliellini. The terminalia of *Sylvenomyia* males correspond largely with those in some species of the Catochini, another lestremiine tribe. Last but not least, crenulate whorls of sensory hairs, the presence of which is exceptional among porricondylines, is a feature typical of lestremiines. We do not stress these similarities to suggest a close interrelationship between *Sylvenomyia* and certain Lestremiinae but to support our assumption that *Sylvenomyia* belongs to a basal porricondyline lineage distinct from other such lineages, such as the Diallactini, Winnertziini and Heteropezini.

Sylvenomyia spinigera **(Spungis 1985) comb. nov.**

(Fig. 1B, C)

Chastomera spinigera—Spungis 1985: 46. [Holotype studied.]
Haplusia spinigera — Gagné 2004: 48 [as a consequence of synonymizing *Chastomera* Skuse with *Haplusia* Karsch, see Gagné 1978].
= *Sylvenomyia sueciae* Mamaev & Zaitzev 1998—Mamaev & Zaitzev 1998: 212. **Syn. n.** [Holotype not studied.]

Supplement to the descriptions by Spungis (1985) and Mamaev & Zaitzev (1998). Body size 1.1–1.3 mm. Male antenna with 11 flagellomeres; fourth flagellomere with 1 complete, or almost complete, crenulate whorl of long sensory hairs, 1–2 short crenulate rows of sensory hairs ventrally, numerous hair-shaped translucent sensilla distally. In some specimens a vestige of CuA1 present distally. Ventral emargination of gonocoxites U-shaped (Fig. 1B), not V-shaped as depicted by Mamaev and Zaitzev (1998: fig. 1d). Gonostylus stout, very slightly curved; apical claw comparatively broad basally (Fig. 1B). Membranous cap of ejaculatory apodeme small (Fig. 1C). Serration of ventrolateral tegmen margins inconspicuous (Fig. 1C).

Remarks on taxonomy. *Chastomera spinigera* Spungis, of which we studied the holotype, and *Sylvenomyia sueciae* Mamaev & Zaitzev, which we identified by the original description, are no doubt identical. We may assume that Mamaev and Zaitzev simply overlooked the existence of *Chastomera spinigera*, as the latter was originally assigned to the Diallactini by Spungis (1985). The wing venation in *spinigera* is indeed superficially similar to that in *Chastomera* species, but the outline of the apices of antC and R5 is much different. Also, the male antenna in *Chastomera* and other Diallactini has 14 flagellomeres, unlike 11 flagellomeres in *spinigera*. The antennal apices of the holotype of *spinigera* are broken.

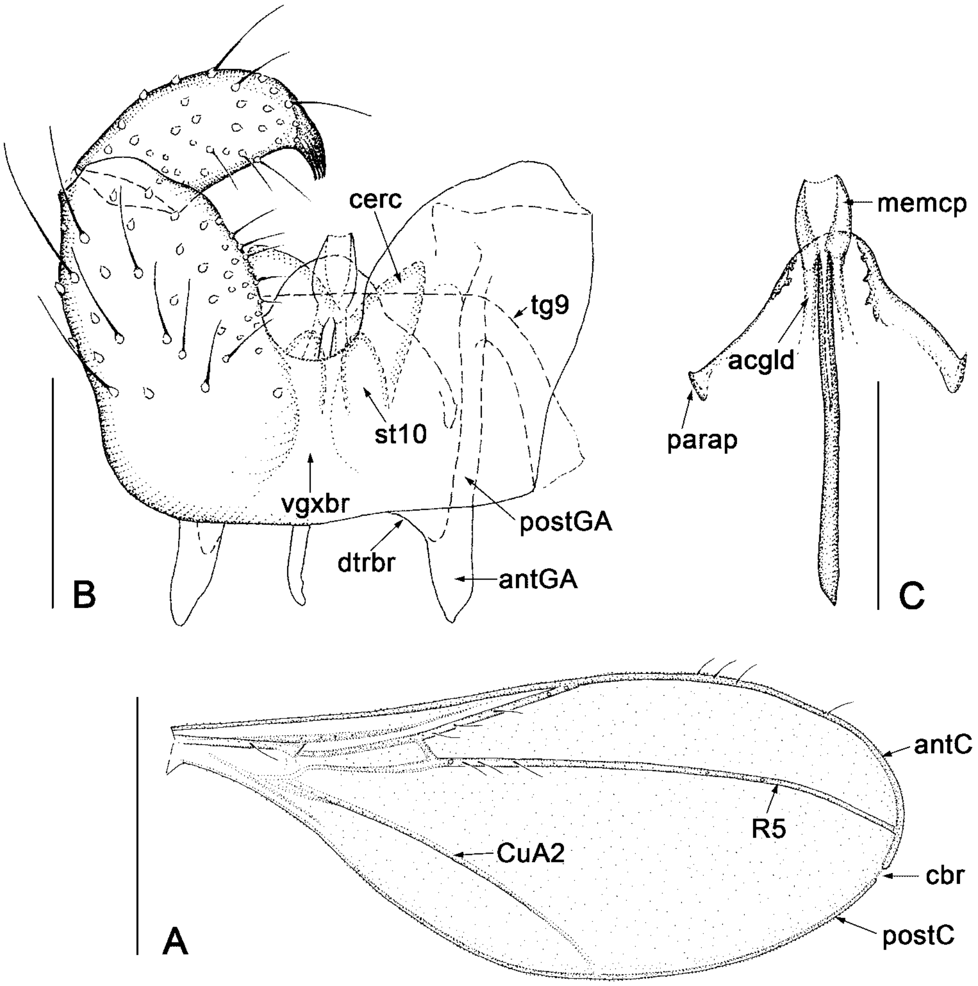

FIGURE 1. Morphology of *Sylvenomyia* spp. A: Wing of *S. fennica* **sp. n.**, dorsal view (holotype, 0.5 mm). B: Male terminalia of *S. spinigera*, ventral view (specimen from Lieksa, 0.05 mm). C: Ejaculatory apodeme and tegmen of *S. spinigera*, ventral view (specimen from Kondopoga, 0.05 mm). acgld = accessory gland duct, antC = anterior portion of costa, antGA = anterior portion of gonocoxal apodeme, cbr = costal break, cerc = cercus, dtrbr = dorsal transverse bridge, memcp = membranous cap, parap = parameral apodeme, postC = posterior portion of costa, postGA = posterior portion of gonocoxal apodeme, vgxbr = ventral gonocoxal bridge.

The original description of *Sylvenomyia sueciae* is misleading in several respects. Tergite 9 was depicted to have an apicomesal invagination (Mamaev & Zaitzev 1998: fig. 1a), which is no doubt an artifact that occurs when the weak apical margin is folded between the cerci. In our specimens tergite 9 has always a straight apical margin (Fig. 1B). The tegmen in the figure by Mamaev and Zaitzev (1998: fig. 1d) is very large, almost as long as the gonocoxites, which ignores the fact that the lateral tegmen walls and the gonocoxal apodemes are separate structures and situated on different levels. In our experience, misinterpretation of artifacts and non-appreciation of the three-dimensionality of structure are common sources of error in the taxonomic work on both porricondylines and lestremiines.

Distribution and phenology. *Sylvenomyia spinigera* is known to occur in Latvia, northern European Russia, Finland and Sweden. Adults were collected in various forests of the nemoral, boreo-nemoral and boreal (taiga) zone between late May and early July. Larvae are unknown, but we assume they live, possibly exclusively, in the decaying wood of aspen *Populus tremula*. We base our assumption on the observation that adults of *spinigera* were repeatedly collected by trunk-emergence traps set over large aspen logs, whereas no specimens were obtained from logs of other tree species, such as *Picea abies*, *Pinus sylvestris*, *Betula* spp., *Alnus* spp. and *Tilia cordata* (Jakovlev *et al.*, *in prep.*).

Material studied. Latvia: holotype male, Koknese, 8 June 1980, V. Spungis. Finland: 13 males, *Ta*, Lammi, Kotinen Nature Reserve, 61.24 N / 25.06E, 24 May–27 June 2004, J. Jakovlev; 14 males, *Sb*, Savonranta, Raatelamminsalo, 62.26N / 28.97E, 3 June–3 July 2004, J. Penttinen; 2 males, *Kb*, Lieksa, Patvinsuo National Park, Autiovaara, 63.08N / 30.37E, 7 July 2004, M. Jaschhof. Russia: 4 males, Karelia, Kondopoga, Kivach Strict Nature Reserve, 62.16N / 33.38E, 11 June–15 July 2005, N. Kutenkova, M. & C. Jaschhof.

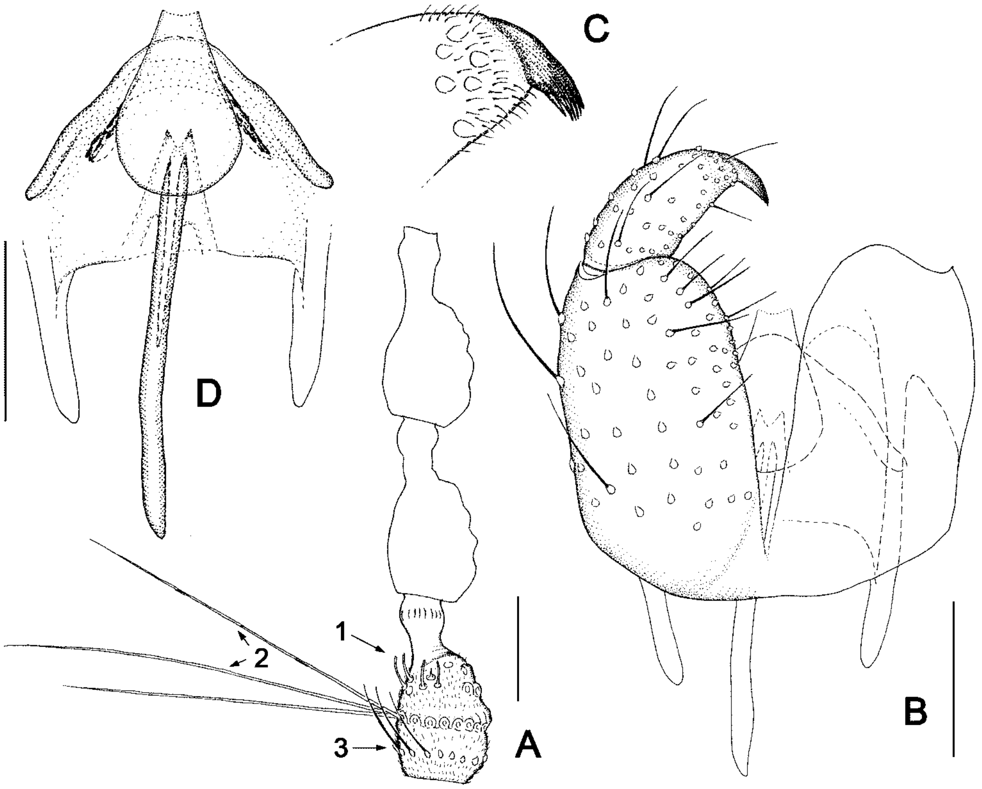

FIGURE 2. *Sylvenomyia fennica* **sp. n.** A: Male antennal flagellomeres 2–4, ventrolateral view (holotype). B: Male terminalia, ventral view (holotype). C: Apex of gonostylus, dorsal view (specimen from Kittilä, without scale). D: Ejaculatory apodeme and tegmen, ventral view (holotype). Scale = 0.05 mm. 1 = hair-shaped translucent sensilla, 2 = sensory hairs, 3 = setae.

Sylvenomyia fennica **sp. n.**
(Figs 1A, 2)

Diagnosis. Males of *Sylvenomyia fennica* differ from males of *Sylvenomyia spinigera*, which is a closely similar species, as follows. The hair-shaped translucent sensilla on the antennal flagellum are shorter and fewer. CuA1 is never traceable. The ventral emargination of the gonocoxites is deep-V-shaped (Fig. 2B). The gonostylus is more elongate and less curved; the apical claw is more slender (Fig. 2B). The ejaculatory apodeme bears apically a very large membranous extension (Fig. 2D). The ventrolateral tegmen margins have a scaly surface that in some specimens is more distinctive than in others (Fig. 2D).

Distribution and phenology. *Sylvenomyia fennica* is apparently widespread throughout Finland and, according to our records, penetrates northwards to 67° N. Adults were collected exclusively in stands of old-growth taiga between late June and late August. Most of the specimens were caught by sweepnet, a few others by Malaise trap. Larvae are unknown.

Etymology. The species epithet refers to the distribution range as currently known.

Types. Holotype. Male, Finland, *Ok*, Kuhmo, Kieverrysjärvet, 63.46N / 29.53E, in mixed taiga (spruce, pine, birch), 17 July 2004, by sweepnet, M. Jaschhof. **Paratypes.** 1 male, same data as the holotype; 1 male, Finland, *Ob*, Pudasjärvi, Syöte National Park, 65.46N / 27.44E, in mixed taiga (spruce, aspen, birch), 22 July 2004, by sweepnet, M. Jaschhof. The type material of the new species is deposited in the Zoological Museum, University of Helsinki, Finland.

Further material. Finland: 1 male, *St*, Ikaalinen, Seitseminen National Park, Multiharju, 61.54N / 23.25E, 2 July–24 Aug. 2004, M. & C. Jaschhof; 2 males, *Ta*, Tammela, Liesjärvi National Park, 60.39N / 23.54E, 26 June–29 Aug. 2004, M. & C. Jaschhof; 1 male, *Tb*, Saarijärvi, Pyhä-Häkki National Park, E Poika-aho farm, 62.51N / 25.26E, 4 July–22 Aug. 2004, M. & C. Jaschhof; 1 male, *Kb*, Lieksa, Jongunjoki Nature Reserve, 3 km S Telio, 63.44N / 29.51E, 18 July 2004, M. Jaschhof; 1 male, same data as the holotype; 3 males, *Ok*, Kuhmo, Elimyssalo Nature Reserve, S Viiksimo, 64.14N / 30.23E, 18/19 July 2004, M. Jaschhof; 1 male, *Lk*, Kittilä, Pallas-Yllästunturi National Park, S Linkukero, 67.44N / 24.21E, 17/18 July 2005, M. Jaschhof.

Conclusions

The case of *Sylvenomyia* is symptomatic of the current state of porricondyline systematics: taxonomic literature is to a large part insufficient for species recognition; an unknown number of species have apparently been described two or even more times under different names; the concepts of genera and tribes are vague; and the interrelationships of the supraspecific taxa remain obscure. The European fauna, which is considered the best-known among all the regional faunas of the earth, was reviewed for the last time more than 40 years ago (cf. Panelius 1965). Since then much energy has been put into the naming of new taxa, while much less effort and ambition has been focused on maintaining, or achieving, a modern standard of taxonomic description and revision. Given such a poor basis on the level of species, the progress achieved in higher-level classification and phylogeny is negligible. Now extraordinary efforts are necessary to make up for the delays of the past few decades. The Swedish Taxonomy Initiative (http://www.artdata.slu.se) has recently approved substantial funding to survey the "Porricondylinae" in Sweden including a rigorous taxonomic revision. The Finnish PUTTE research program of deficiently known and threatened forest species funded a faunistic survey of the "Porricondylinae" in Finland in 2006 and 2007. However, there is nothing that even begins to compare with these two initiatives, so most of the world porricondyline fauna remains unknown.

Acknowledgements

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