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New faunistic records of Myrmeleontoid lacewings (Neuroptera: Myrmeleontidae, Ascalaphidae, Nemopteridae) in Armenia

Новые фаунистические находки мирмелеонтоидных сетчатокрылых (Neuroptera: Myrmeleontidae, Ascalaphidae, Nemopteridae) в Армении

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Key words: antlions, owlflies, spoonwings, Armenia.

Ключевые слова: муравьиные львы, аскалафы, нитекрылки, Армения.

Abstract. New records of 19 species of myrmeleontoid lacewings (Neuroptera: Myrmeleontidae, Ascalaphidae, Nemopteridae) of Armenian fauna are presented. In comparison with adjacent Caucasian countries Armenian fauna of antlions, spoonwings and owlflies could be characterized as manifold, organized under the influence of Anatolian faunistic center. *Distoleon laticollis* (Navás, 1913), *Delfimeus irroratus iranensis* (Hölzel, 1972), *D. irroratus morgani* (Navás, 1913), *Neuroleon tenellus* (Klug in Ehrenberg, 1834), *Creoleon griseus* (Klug in Ehrenberg, 1834), *Libelloides macaronius kolyvanensis* morpha *alba* Krivokhatsky, Bagaturov et Prokopov, 2018 are reported for Armenia for the first time. Here we proposed a new status for three taxa, which are interpreted as subspecies of *Delfimeus irroratus* (Olivier, 1811): *D. irroratus morgani* **stat. n.**, *D. irroratus iranensis* **stat. n.** and *D. irroratus friedeli* (Hölzel, 1972), **stat. n.** All four taxa (including the nominotypical subspecies) differ in the pronotum pattern and the color of wings and have a partially sympatric distribution. The largest representatives (forewing 25 mm) nominotypical subspecies and a small subspecies *D. irroratus friedeli* with dense venation were not found in Armenia.

Резюме. Представлены новые указания 19 видов мирмелеонтоидных сетчатокрылых для Армении. По сравнению с фаунами соседних кавказских стран фауна муравьиных львов, нитекрылок и аскалафов Армении может быть определена как переходная, находящаяся под влиянием Анатолийского фаунистического центра. *Distoleon laticollis* (Navás, 1913), *Delfimeus irroratus iranensis* (Hölzel, 1972), *D. irroratus morgani* (Navás, 1913), *Neuroleon tenellus* (Klug in Ehrenberg,

1834), *Creoleon griseus* (Klug in Ehrenberg, 1834) и морфа *Libelloides macaronius kolyvanensis* morpha *alba* Krivokhatsky, Bagaturov et Prokopov, 2018 впервые указываются для Армении. Мы предлагаем новый статус для трех таксонов, которые интерпретируются здесь как подвиды вида *Delfimeus irroratus* (Olivier, 1811): *D. irroratus morgani* **stat. n.**, *D. irroratus iranensis* **stat. n.** and *D. irroratus friedeli* (Hölzel, 1972), **stat. n.** Все 4 таксона (включая номинативный подвид) отличаются рисунком пронотума и цветом крыльев и имеют частично перекрывающиеся ареалы. Крупнейший (переднее крыло 25 мм) номинативный подвид и маленький подвид *D. irroratus friedeli* с густым жилкованием не были найдены в Армении.

Special studies of lacewings including antlions have not been conducted in Armenia. Some data on antlions were published in reviews dedicated to larger territories and based on the materials collected in 19th–20th centuries [Esben-Petersen, 1913; Hölzel, 1972; Aspöck et al., 1980a, b; Zakharenko, Krivokhatsky, 1993; Aspöck et al., 2001]. In recent years the fauna of antlions was studied rather comprehensively in neighboring territories: Dagestan [Ilyina, Krivokhatsky, 2012; Ilyina et al., 2014] and Krasnodar Region [Shchurov, Makarkin, 2013] of Russia, Georgia [Dobosz et al., 2017, 2018], Azerbaijan [Kerimova, Krivokhatsky, 2018a, b], Turkey [Ari, 2014; Canbulat, 2007].

The material for this study was collected mainly in central and southern provinces of Armenia (Kotayk, Ararat and Syunik) during 2016–2017. The material was fixed using the methods applying for cytogenetic and molecular

studies in ethanol-acetic mixture and partly in ethanol. Data on correctly recognizable specimens from the photos taken from the natural habitats are included into the list as well. The material is deposited in the Zoological Institute of the Russian Academy of Sciences (ZIN, St Petersburg, Russia); some data on the structure of the reproductive systems of Myrmeleontiformia have already been published [Kuznetsova et al., 2019].

In addition to these recently collected materials, data on materials from the collections of ZIN and Moscow State University (ZMM, Moscow, Russia) were partly taken into consideration as well. For these materials the label data are provided together with current geographic names corresponding to well-known web-resources [e.g., Google Earth] and given in the square brackets.

Family Myrmeleontidae

Palpares libelluloides (Linnaeus, 1764)

Material. 1♀, Ararat Prov., env. Lanjar vill., 39.81887°N / 44.98507°E, 1796 m, 18.08.2016 (A. Danchenko); 1♀, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Distribution. *Palpares libelluloides* is a widespread Eastern Mediterranean species with two main exclaves: the South European-African and the Caucasian-Asian. The species is regularly collected in Armenia since 1926 [Krivokhatsky et al., 2017].

Palpares turcicus Koçak, 1976

(Fig. 1)

Material. 2♀, Ararat Prov., ~5 km ENE Surenavan vill., 39.8097°N / 44.8354°E, Uranots locality, 12.07.2007 (Fig. 1, photo by M. Kalashian).

Distribution. This Irano-Anatolian species is represented in ZIN collection by materials from Armenia since 1864 [Krivokhatsky et al., 2017].

Distoleon laticollis (Navas, 1913)

Material. 2♂, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Additional material. Israel: 1♂ (ZIN), Akhziv, 29.07.1996 (M. Volkovitch, M. Dolgovskaya) (photo published in [Krivokhatsky, 2003]).

Distribution. Described from Syria in the genus *Formicaleo* sensu Brauer, 1854. Reported by Hölzel [1972] from Israel, Lebanon, Sudan and Ethiopia. Widely spread on Arabian Peninsula and in Levant [Aspöck et al., 2001]. East-Mediterranean species, firstly recorded from Armenia.

Delfimeus irroratus (Olivier, 1811)

Delfimeus irroratus subsp. *iranensis* (Hölzel, 1972), **stat. n.**

Material. 1♂, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Additional material. Azerbaijan: 1♂ (ZIN), Ordubad, 19.06.1931 (M. Rjabov).

Iran: 2♂ (ZIN), Shahrud, 6.07.1914 (A. Kiritschenko).

Notes. See explanation for a new status in the next subspecies. The dark brown subspecies, diagnosed by pronounced v-shaped figure on pronotum.

Delfimeus irroratus subsp. *morgani* (Navás, 1913), **stat. n.**

Material. 1♂, 2♀, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Additional material. Armenia: 5♂ (ZIN), Meghri, Aras River, 30.08.1932 (I. Rodionov).

Notes. Small light subspecies, forewing 20 mm, pronotum without obvious brown pattern. Since 2001 Krivokhatsky [2003] in the Internet project ZInsecta above mentioned listed the following four taxa as conspecific: *Delfimeus irroratus* (Olivier, 1811) = *Maracanda morgani* Navás, 1913 = *Pignatellus friedeli* Hölzel, 1972 = *Pignatellus iranensis* Hölzel, 1972. Here we proposed a new status for three taxa which are interpreted as subspecies of *Delfimeus irroratus* (Olivier, 1811): *D. irroratus morgani* **stat. n.**, *D. irroratus iranensis* **stat. n.** and *D. irroratus friedeli* (Hölzel, 1972), **stat. n.** All four taxa (including the nominotypical subspecies) differ in the pronotum pattern and the color of wings and have a partially sympatric distribution. The largest representatives (forewing 25 mm) nominotypical subspecies and a small subspecies *D. irroratus friedeli* with dense venation differ from each other according to the diagnosis of Hölzel [1972] and were not found in Armenia.

Distribution. The South-Western Palaearctic species. According to the most recent compendium [Aspöck et al., 2001] *Delfimeus irroratus* was recorded from Armenia; two taxa *D. irroratus morgani* and *D. irroratus iranensis*, were reported for Iran only. Both subspecies are recorded from Armenia for the first time.

Macronemurus persicus Navás, 1915

Macronemurus persicus var. *graciosa*

Krivokhatsky, Dobosz et Khabiev, 2015

Material. 1♀, 1♂, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Macronemurus persicus var. *persica* Navás, 1915

(Fig. 2)

Material. 1♀, Ararat Prov., env. Goravan vill., Goravan Sands Sanctuary, 11.07.2007 (Fig. 2, photo by M. Kalashian).

Distribution. Kura-Araxian – South-Turanian species, from Armenia previously reported from Meghri. Nominative variation *Macronemurus persicus* var. *persica* predominate among Armenian populations [Krivokhatsky et al., 2015].

Neuroleon (Ganussa) tenellus (Klug in Ehrenberg, 1834)

Material. 2♀, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Distribution. The widely distributed Southern Palaearctic, mainly East-Mediterranean species [Krivokhatsky, 1996]; biogeographic indicator for Anatolian original fauna [Krivokhatsky, Emeljanov, 2000]. Recorded from Armenia for the first time.

Creoleon plumbeus (Olivier, 1811)

(Fig. 3)

Material. 1♂, Syunik Prov., N env. Kapan town, Shahumyan locality, 1.08.2007 (Fig. 3, photo by M. Kalashian); 2♂, 3♀, Ararat Prov., env. Lanjar vill., 39.81887°N / 44.98507°E, 1796 m, 18.22.08.2016 (A. Danchenko).

Additional material. Armenia: 1♀ (ZIN), Echmiadzin, 4.07.1925; 1♂ (ZIN), Lori Prov., Aghtala [Akhtala], 26.08.1925; 1♀ (ZIN), Yerevan env., 2.07.1928 (A. Shelkovnikov); 1♂ (ZIN), Meghri, 3.07.1929 (A. Shelkovnikov); 1♂ (ZIN), Zanga [Hrazdan] River Valley, pr. Erivan, 13.07.1932 (G. Kostylev); 1♀ (ZIN), Aras, 6.08.1932 (M. Rjabov); 1♀ (ZIN), Yerevan, 15.09.1991 (M. Kalashian).



Figs 1–10. Myrmeleontoid lacewings.

1 – *Palpares turcicus*, female, Uranots; 2 – *Macronemurus persicus* var. *persica*, female, Goravan; 3 – *Creoleon plumbeus*, male, Shaumyan; 4 – *Acanthaclisis occitanica* morpha *typica*, female, Hatsavan; 5 – *Libelloides macaronius kolyvanensis*, female, Geghanush; 6 – *Nemoptera sinuata*, male and female, Khosrov Reserve; 7 – *Lerthta ledereri*, female, Goravan; 8 – *Lerthta ledereri*, male, Turkey; 9 – *Olivierina extensa*, female, Goravan; 10 – *O. extensa*, female, Meghri. 1–3, 5–7, 9 – photos by M. Kalashian, 4 – photo by S. Shinkarenko, 8 – photo by Ju. Samartseva, 10 – photo by V. Krivokhatsky.

Рис. 1–10. Мирмелеонтидные сетчатокрылые.

1 – *Palpares turcicus*, самка, Уранот; 2 – *Macronemurus persicus* var. *persica*, самка, Гораван; 3 – *Creoleon plumbeus*, самец, Шаумян; 4 – *Acanthaclisis occitanica* морфа *typica*, самка, Ацаван; 5 – *Libelloides macaronius kolyvanensis*, самка, Гегануш; 6 – *Nemoptera sinuata*, самец и самка, Хосровский заповедник; 7 – *Lerthta ledereri*, самка, Гораван; 8 – *Lerthta ledereri*, самец, Турция; 9 – *Olivierina extensa*, самка, Гораван; 10 – *Olivierina extensa*, самка, Мегри. 1–3, 5–7, 9 – фото М. Калашяна, 4 – фото С. Шинкаренко, 8 – фото Ю. Самарцевой, 10 – фото В. Кривоухатского.

Distribution. The ancient-Mediterranean *Creoleon plumbeus* is biogeographic indicator for Anatolian original fauna [Krivokhatsky, Emeljanov, 2000]. It is known from Armenia since the beginning of 19th century [Hagen, 1858].

Creoleon griseus (Klug, 1834)

Material. 1♀, Yerevan, 40.20888°N / 44.53647°E, 1250 m, 15.08.2016 (I. Stepanyan).

Distribution. Ancient-Mediterranean, mainly Sahara-Turanian species, firstly recorded from Armenia. Species known from Sudan, Egypt, Tunisia, Israel, Palestina, South Arabia, Oman, Iran, Turkmenistan, Uzbekistan, Tadjikistan and India.

Myrmeleon hyalinus Olivier, 1811
subsp. *distinguendus* Rambur, 1842

Material. 1♂, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Additional material. Armenia: 1♀ (ZIN), Migry [Meghri], Aras River, 2.06.1957 (V. Trjapitzyn).

Distribution. The widespread Sahara-Turanian species. The subspecies *distinguendus* is distributed in South Europe and common in Transcaucasia. It was not recorded from Armenia in the recent compendium [Aspöck et al., 2001] where this taxon is listed as a separate species.

Myrmecaelurus trigrammus (Pallas, 1771)

Material. 1♀, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan); 1♀, Kotayk Prov., env. Geghadir vill., 23.08.2016 (A. Danchenko); 1♀, Armavir Prov., Yervandashat env., 40.10367°N / 43.68528°E, 957 m, 21.09.2016 (G. Karagyan).

Additional material. Armenia: 1♂ (ZMM), Yerevan env., 16.07.1932 (P. Kostylev); 1♂ (ZMM), Dzhrvezh, Yerevan env., 23.06.1960 (G. Dlussky); 2♀ (ZMM), Migry [Meghri], 6.08.1977 (A. Lisetsky); 1♂, 1♀ (ZMM), Migry [Meghri], 10.07.1997 (N. Filippov).

Distribution. The Ancient-Mediterranean West Palaearctic species. It was not recorded from Armenia in the recent compendium [Aspöck et al., 2001], but listed and indicated for the country on a map of distribution of the species in the fauna of Russia [Krivokhatsky, 2011].

Myrmecaelurus solaris Krivokhatsky, 2002

Material. 2♂, 2♀, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan); 1♂, 2♀, Ararat Prov., env. Lanjar vill., 39.81887°N / 44.98507°E, 1796 m, 22.08.2016 (A. Danchenko); 1♀, Kotayk Prov., env. Geghadir vill., 28.08.2016 (A. Danchenko).

Distribution. The Irano-Turanian species, which is known from Armenia by the type series (four paratypes deposited in ZIN) from this country. Paratypes originated from Chimankend [Urtsadzor], Yerevan, Migry [Meghri] and Vedi [Krivokhatsky, 2002].

Nohoveus armenicus (Krivokhatsky, 1993)

Material. 1♀, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Additional material. Armenia: 1♀ (ZIN), Garni env., Ghehard [Geghard] River, 1350 m, 13.07.2003 (A. Koval).

Distribution. The Turano-Anatolian species, known from Armenia (type locality is Echmiadzin), Azerbaijan, Turkey, and Iran [Krivokhatsky, 1993; Kerimova, Krivokhatsky, 2018b].

Nohoveus zigan (Aspöck, Aspöck et Hölzel, 1980)

Material. 1♀, Armavir prov., Yervandashat env., 40.10367°N / 43.68528°E, 957 m, 21.09.2016 (G. Karagyan); 1♂, env. Goravan vill., Goravan Sands Sanctuary, 39.88915°N / 44.73302°E, 956 m, 31.05.2017 (T. Ghrejian).

Distribution. The South-Scythian – North-Turanian species [Krivokhatsky, 1994], recorded from Armenia as *Nohoveus punctulatus* (Steven in Waldheim, 1846) [Aspöck et al., 2001].

Cueta anomala Navás, 1915

Material. 1♂, Ararat Prov., env. Dashtakar vill., 39.92319°N / 44.74741°E, 965 m, 6.08.2016 (G. Karagyan).

Additional material. Armenia: 1♀ (ZIN), No 7346, Ehegnadzor [Yeghegnadzor], 1.07.1979 (A. Zakharenko).

Azerbaijan: 1♂ (ZIN), Geok-Tapa, 24.07.1901 (R. Schmidt); 1♀ (ZIN), Aras River, between Nuvadi and Syurtui, 3.09.1932 (I. Rodionov); 1♀ (ZIN), Aresch, no date (A. Schelkownikov).

Distribution. This widespread Kura-Aras-Anatolian species occurs in Iran, Anatolia and the Caucasus [Krivokhatsky, 2011]. It has been recorded for Armenia and Azerbaijan without a distinct locality by Krivokhatsky [2011]. Localities of this species in Armenia are published here for the first time.

Acanthaclisis occitanica (Villers, 1789)

Acanthaclisis occitanica morpha *typica*
(Fig. 4)

Material. 1♀, Ararat Prov., Hatsavan vill., at light, 10.06.2018 (Fig. 4, photo by S. Shinkarenko).

Acanthaclisis occitanica morpha *nigrlenta*
Krivokhatsky, 2005

Material. 1♂, Ararat Prov., env. Azat Reservoir, 40.07675°N / 44.51297°E, 1071 m, 11.06.2017 (G. Karagyan).

Distribution. South-West-Palaearctic species, known from Armenia; black striped morpha *nigrlenta* was not registered in Armenia previously [Krivokhatsky, 2005].

Family Ascalaphidae

Libelloides macaronius kolyvanensis (Laxmann, 1770)
(Fig. 5)

Libelloides macaronius kolyvanensis morpha *typica*

Material. 1♀, Syunik Prov., ~5 km N Shvanidzor vill., 21.06.2007 (photo by M. Kalashian); 1♀, Syunik Prov., between Kapan town and Geghanush vill., 27.06.2007 (Fig. 5, photo by M. Kalashian); 2♂, 1♀, Syunik Prov., env. Aygedzor vill., 38.99019°N / 46.18598°E, 1355 m, 4.06.2017 (G. Karagyan).

Libelloides macaronius kolyvanensis morpha *alba*
Krivokhatsky, Bagaturov et Prokopov, 2018

Material. 2♂, Syunik Prov., env. Aygedzor vill., 38.99019°N / 46.18598°E, 1355 m, 4.06.2017 (G. Karagyan).

Distribution. The mostly West-Scythian subspecies, known from the Pontic biogeographic province of the Caucasus. It was recorded for Armenia as *Libelloides macaronius* (Scopoli, 1763) [Aspöck et al., 2001] and as *Libelloides macaronius kolyvanensis* (Laxmann, 1770) [Krivokhatsky et al., 2018]. The rare species in Armenia,

only seven specimens collected from 1924 to 1982 (morpha *typica*) are deposited in ZIN [Krivokhatsky et al., 2018]. Morpho *alba* is recorded for Armenia for the first time. It is remarkable that specimens of both morphs were collected from one population.

Family Nemopteridae

Nemoptera sinuata Olivier, 1811

(Fig. 6)

Material. 2♂, 1♀, Khosrov Forest State Reserve, Central (Vedi) area, 24.06.2006 (Fig. 6, photo by M. Kalashian); 1♀, Ararat Prov., env. Zangakatur vill., 39.841384°N / 45.046694°E, 1870 m, 30.07.2016 (A. Danchenko); 1♂, Ararat Prov., env. Azat Reservoir, 40.07675°N / 44.51297°E, 1071 m, 11.06.2017 (G. Karagyan); 1♂, Syunik Prov., env. Aygedzor vill., 38.99019°N / 46.18598°E, 1355 m (G. Karagyan).

Distribution. The East-Mediterranean species; well-known and usual for Transcaucasia [Alexandrov-Martynov, 1930; Makarian, 1930; Dobosz, Krivokhatsky, 2019]; common in some biotopes in Armenia.

Lertha ledereri (Selys-Longchamps, 1866)

(Figs 7, 8)

Material. 1♀, Ararat Prov., env. Goravan vill., Goravan Sands Sanctuary, 30.05.2009 (Fig. 7, photo by M. Kalashian); 2♂, Ararat Prov., env. Goravan vill., Goravan Sands Sanctuary, 39. 88915°N / E44.73302°E, 956 m, 31.05.2017 (T. Ghrejan).

Additional material. Armenia: 1♂ (ZIN), Asni [currently abandoned], near Arazdayan, Armenia mer., 3.07.1933 (S. Paramonov), "*Lertha ledereri* Selys, S. Paramonov det."; 1♂, 3♀ (ZIN), Vedi env., Goravan Sands, 29–30.05.1996 (M. Volkovitsh).

Turkey: 1♂ (ZIN), "Nemoptera Ledereri Selys Long., Bos Dagh (Tmol), Anatolia", "*Lertha ledereri* Selys, Kolbe det." (Fig. 8).

Distribution. Anatolian species, known from Turkey and Armenia.

Olivierina extensa (Olivier, 1811)

(Figs 9, 10)

Material. 1♀, Ararat Prov., env. Goravan vill., Goravan Sands Sanctuary, 12.07.2007 (Fig. 9, photo by M. Kalashian); 1♂, Ararat Prov., env. Goravan vill., Goravan Sands Sanctuary, 39. 88915°N / 44.73302°E, 956 m, 31.05.2017 (T. Ghrejan).

Additional material. Armenia: 1♂, 1♀ (ZIN), Migry env. [Meghri], 8.07.1931 (All-Union Institute of Plant Protection leg.); 1♀ (ZIN), Migry env. [Meghri], Vedi, 8.07.1931 (All-Union Institute of Plant Protection leg.); 1♀, Zangezour, pr. Megry [Meghri], 07.1935, "*Olivierina extensa* Oliv., Ph. Zaitzev det."; 1♀ (ZIN), Meghri, Aras Valley, 23.06.1974 (M. Volkovitsh); 1♀, Meghri, 27.06.2010 (M. Volkovitsh) (Fig. 10).

Azerbaijan: 1♂, 1♀ (ZIN), Disar, near Ordubad, Nakhichevan, 24.07.1933 (Znoiko).

Iran: 1♂ (ZIN), Abbasan, W Persia, Luristan, 16.05.1914 (Nesterov); 2♂ (ZIN), Abbasan, Persian-Turkistan boundary, "*Olivierina extensa*, Ph. Zaitzev det.", 15.06.1914 (Nesterov); 1♀ (ZIN), Fars Prov., Barm i Firuz, Shiraz env., 19.07.2003 (V. Lukhtanov); 1♂ (ZIN), Azerbaijan Prov., Chajjerli, 2100 m, 13.07.2004 (V. Lukhtanov).

Turkey: 1♂ (ZIN), Elazığ, 23 km NE Kavancılar, 3.07.2005 (M. Volkovitsh); 1♀ (ZIN), Iğdır, Ararat foot, 82 km W Aralık, 8.07.2005 (M. Volkovitsh).

Notes. Almost all of studied specimens are characterized by the presence of the distinct apical white round spot on the apical extension of the hind wing (Figs 9, 10). Only Nakhichevan specimens have the similar spot slightly expressed, cloudy. According to R. Dobosz (personal communication), they should be referred to the species *Lertha palmonii* Tjeder, 1970, but status of this form is disputable and needs further study and clarification.

Distribution. The Anatolian species known from Turkey and Armenia.

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