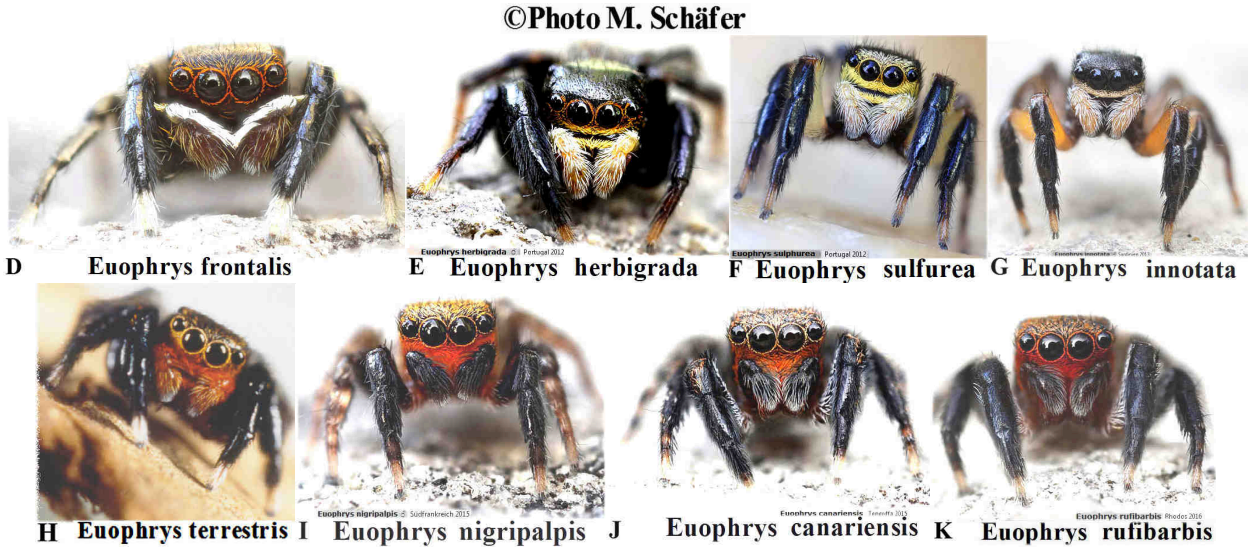
Placement of *Euophrys petrensis* and reinstatement of *Euophrys nearctica* (Salticidae (Araneae)

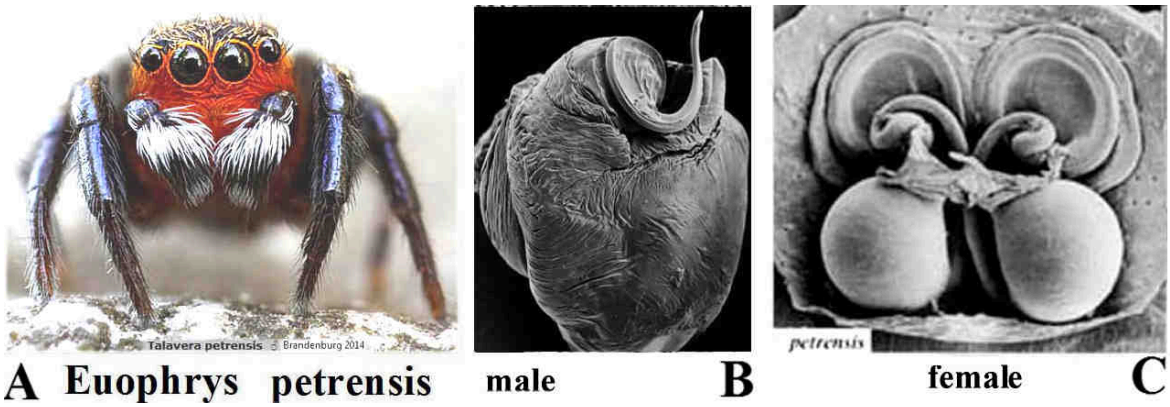
Jerzy Prószyński

Prof. dr. hab., Emeritus, Museum and Institute of Zoology, Polish Academy of Sciences
ul. Wilcza 63, 00-679 Warsaw, POLAND.
e-mail: jerzy.proszynski@wp.pl

ABSTRACT. Discussion on placement of the *Euophrys petrensis* is carried on since Logunov 1993 correctly set the problem. It was tackled in several papers presenting variety of approaches and listed in the appropriate references in the World Spider Catalog. The progress in taxonomic methods presents rather simple solution, documented below - constituting, however, contribution to general problem of shifting the color pattern documentation to live specimen. Paper presents also documents of reinstatement of *Euophrys nearctica* Kaston, 1938 as a valid, separate species.
Nomenclatorical corrections:
Euophrys petrensis C. L. Koch, 1837 transfer from *Talavera* by not yet used method of comparison of color pattern of live specimens within the genus and by precise comparison of genitalic structures.
Euophrys nearctica Kaston, 1938 is reinstated from *Euophrys monadnock* Emerton, 1891, both are valid, separate species.

The discussion on placement of *Euophrys petrensis* versus *Talavera petrensis* was started by Logunov (1992d: 76, f. 19-20, 30), however, without offering the solution. He decided finally for *Talavera* and provided suggestive documentation (Logunov & Kronestedt, 2003: 1144, f. 1, 5, 7, 12, 17-18, 23, 45-46, 143-148), the transfer itself was signalized formally by Żabka & Kupryjanowicz (1997: 170), overlooked by the World Spider Catalog (later in the text = WSC). Majority of subsequent authors followed *Talavera* version, notably Breitling (2019e: 184), who based his opinion using public DNA barcoding data, also Coşar & Danışman, (2021b: 100, f. 6a-g, 7a-c, 8a-b) provided excellent photographs appearance and diagnostic characters of preserved male and female of that species (see Fig 3, below).
Different opinion expressed Prószyński, Lissner & Schäfer (2018: 44, f. 3A-E, 4H, 6A, 7E) revising genera *Euophrys* (including *petrensis*), *Talavera and Pseudeuophrys* on their most important morphological characters, including terrific **color photographs of live specimens** of these genera by Schäfer and Lissner. The present paper, continuing that of 2018, concentrates on frontal color pattern because empirical data prove that it differentiates most clearly relevant species. Subjective interpretations, based on generally credible data, suggests exceptional diagnostic importance of these characters in Salticidae - enabling selection of conspecific mating partner (together with other signals, e.g. pheromones) during face to face encounters - therefore initial part of speciation mechanisms, as such more stable. The visual signals, read by a partner, is enhanced by gestures of species-specific recognition dances (see fascinating videos by J. Otto). Color pattern on parts of body, less visible to partners, can influence speciation in different ways, adaptable to varying environment - as survival, mimicry, camouflaging, etc..
The additional purpose of comparison presented here, is to test placement of *"petrensis"* (Figs 1A-K) among nine species of *Euophrys* and three species of of *Talavera* (Figs 2A-G) - those for which exists suitable documentation.





Figs 1. Photograph of live specimen of *Euophrys petrensis*, frontal view (A), with SEM of palp organ (note coil of embolus) (B), and cleared epigyne, with spermathecae and ducts, dorsal view (C), D-K - two rows above - comparison of frontal views of eight more species of European *Euophrys* - *Euophrys frontalis* [TYPE SPECIES] (D), *Euophrys herbigrada* (E), *Euophrys sulfurea* (F), *Euophrys innotata* (G), *Euophrys terrestris* (H), *Euophrys nigripalpis* (I), *Euophrys canariensis* (J) and *Euophrys rufibarbis* (K).
SOURCE: All photos of live specimens and their identification by © M. Schäfer, SEM (B-C) from Logunov & Kronestedt (2003). All © copyrights are retained by the original authors and copyright holders, used here by their courtesy.

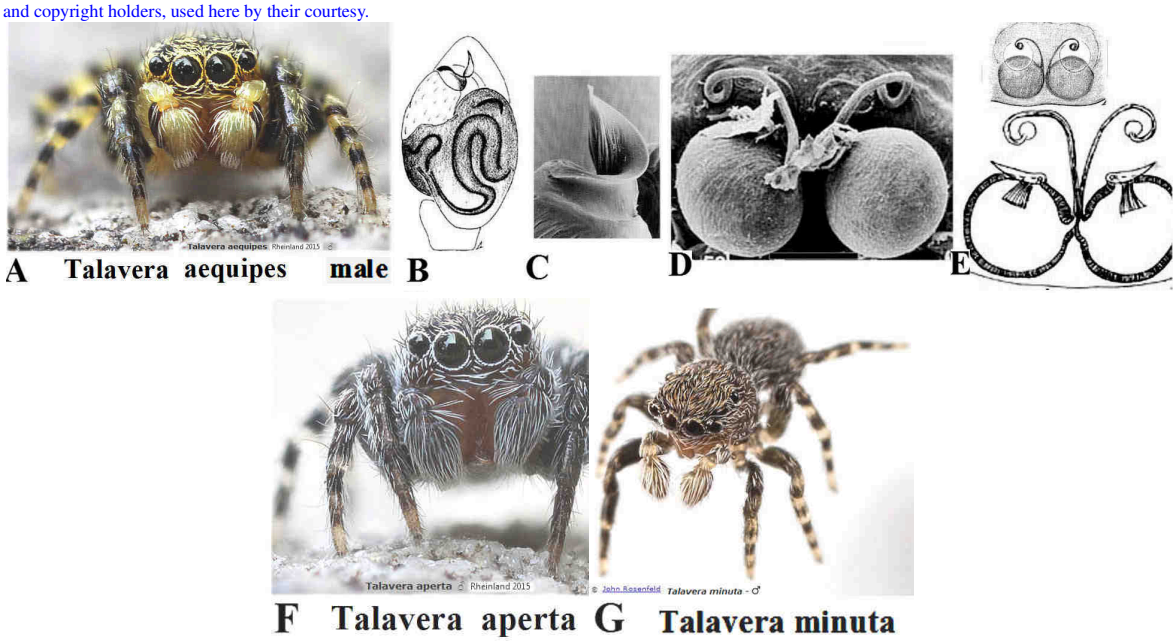


Fig 2. Photograph of live specimen of *Talavera aequipes* - frontal view (A), palp (B), and tip of is embolus (C), spermathecae and ducts SEM (D), epigyne and spermathecae (E), comparative photos of *Talavera aperta* (F) and *Talavera minuta* [TYPE SPECIES] (G).
SOURCE: A, F - ©Photos J. Lissner, B-E - © Logunov & Kronestedt, T. (2003), G - ©Photo. J. Rosenfeld. All ©copyrights are retained by the original authors and copyright holders, used here by their courtesy.

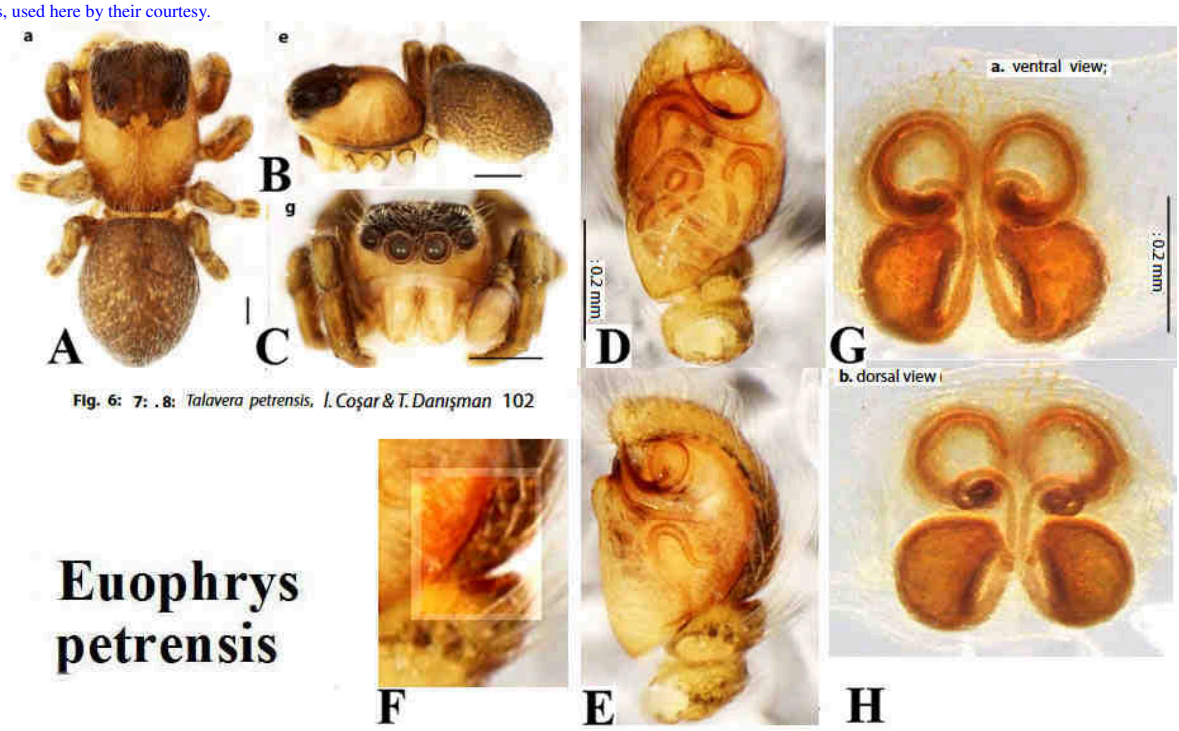
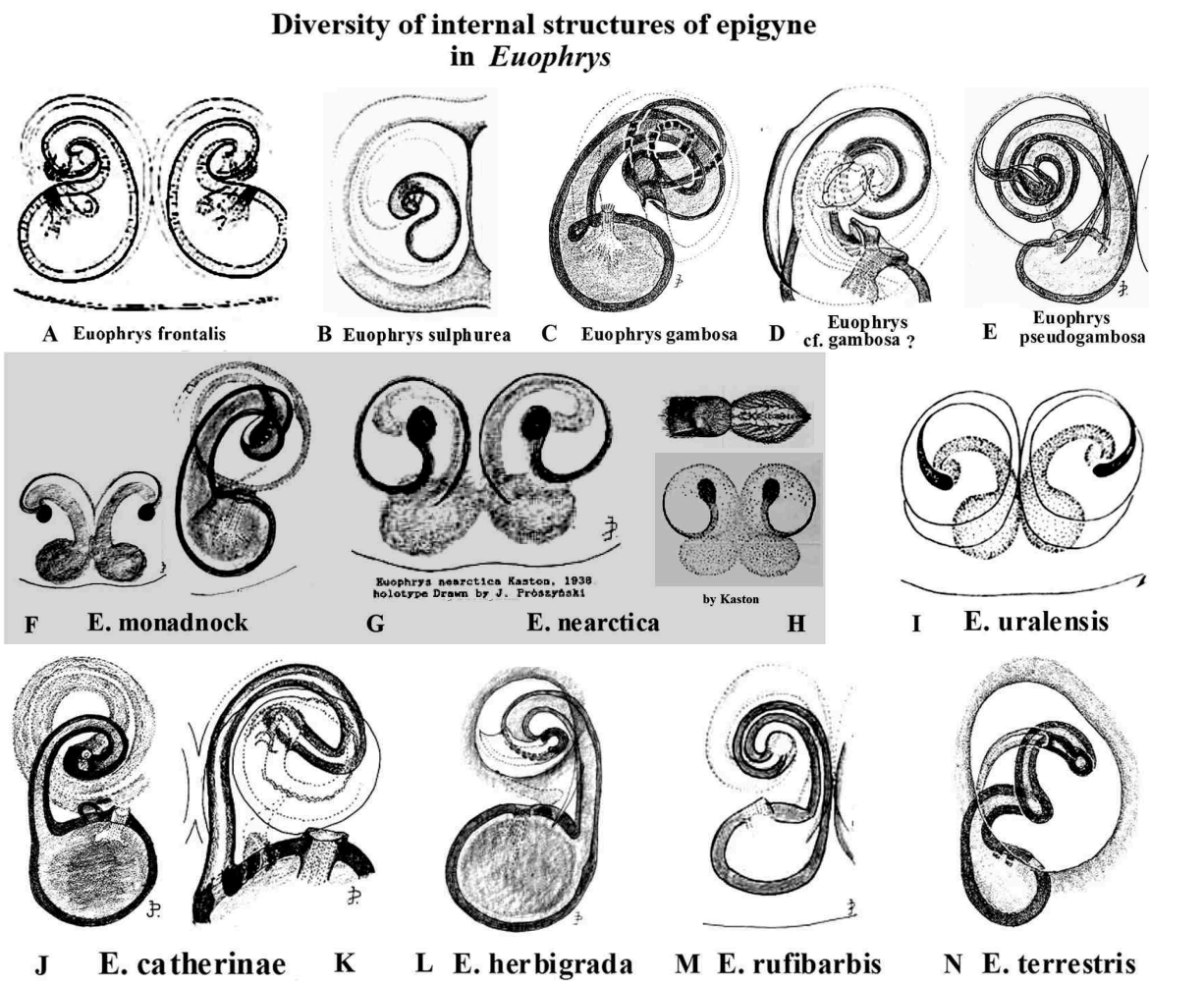
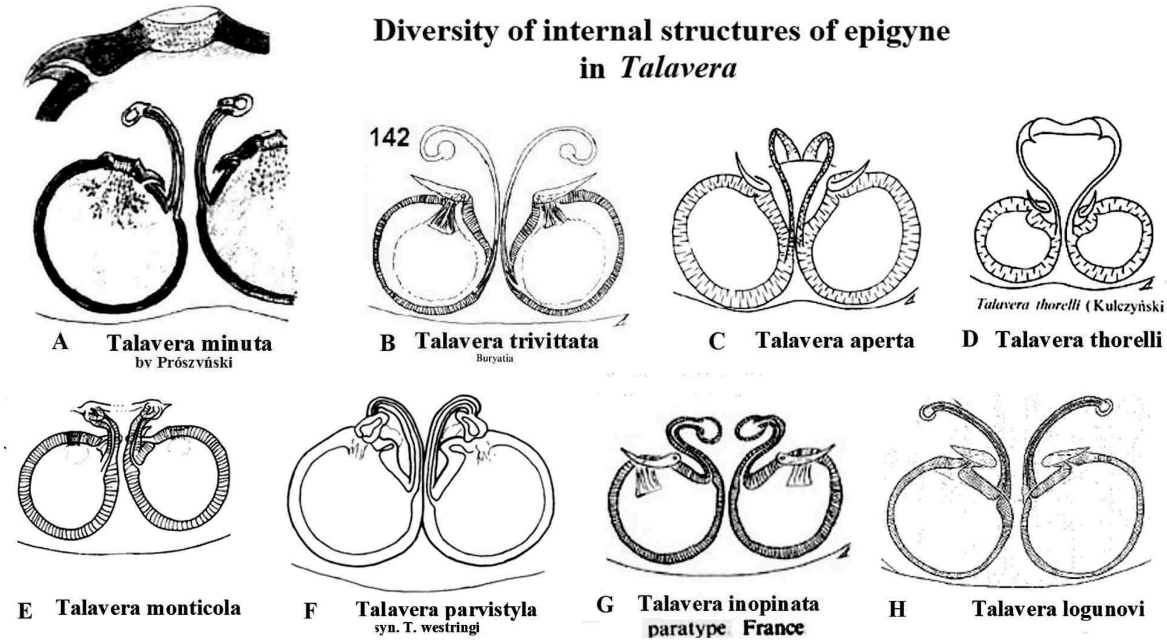


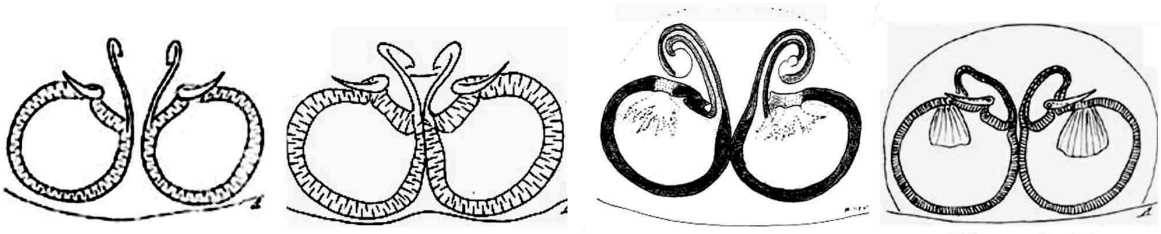
Fig 3 . Photo documentation **of preserved** *Euophrys petrensis* (compare photos of live specimens of same species - Fig 1A, above),

universally used in current literature. Note indistinct dark spire-like shade pressed to bulbus (E and F) which could be reduced apophysis which, however, require more research.
SOURCE: Coşar & Danışman, 2021b: 100, f. 6a-g, 7a-c, 8a-b.



Figs 4. Diversity of internal structures of epigyne in *Euophrys*. A - *Euophrys frontalis*, B - *E. sulphurea*, C - *E. gambosa*, D - *E.* cf. *gambosa*, E - *E. pseudogambosa,* F - ***E . monadnock***, G-H - ***E. nearctica***, I - *E. uralensis*, J-K - *E. catherinae* (two specimens), L - *E. herbigrada*, M - *E. rufibarbis*, N - *E. terrestris*.
SOURCES: A - Żabka M. 1997: 46, f. 89-98, B-E, J-N Prószyński (2003) 49-51, f. 163-195, F-G - Prószyński J. 2003b: Internet, H - Kaston, B. J. (1938c). Bulletin of the Brooklyn Entomological Society 33: 187, pl. 9, f. 25-26.





Figs 5. Diversity of internal structures of epigyne in *Talavera*. A - *T. minuta* and magnified openings atop spermatheca [TYPE SPECIES], B - *T. trivittata*, C - *T. aperta,* D - *T. thorelli*, E - *T. monticola* , F - *T. parvistyla*, G - *T. inopinata*, H - *T. logunovi*, I - *T. esyunini,* I - *T. ikedai*, K - *T. milleri*, J - *T. sharlaa*.

SOURCES: A- Prószyński (1990p). Private preprint, also Internet Salticidae Database, B-D E, G, I-J, L - Logunov Kronestedt 2003. J. Natural History, 2003. H - Kovblyuk & Kastrygina (2015) Arthropoda Selecta 24(2): 201-205 , F - Żabka (1997). K - Miller, 1971. Acta Societatis Zoologicae Bohemicae 66: 140, pl. XX, f. 20,

RESULTS. **Answer to the question to which genus belongs** species "*petrensis"* C. L. Koch, 1837 is **- it belongs to** the genus *Euophrys* C. L. Koch, 1834 because of:
1 - frontal color pattern of live males (= pattern seen by female encountering male during recognition and mating dance) (Fig. 1A), fits into such pattern in series of other live species of *Euophrys* (Fig. 1D-K),
2 - male palps (Fig. 1B, 3D-F) agrees with structure of series of other species of *Euophrys* (see Prószyński et al,. 2018), in particular by incomplete coil of embolus,
3 - internal structure of epigyne (Figs 1C, 3G-H, 4A-N) fits into series of such structures in other species of *Euophrys* (Fig. 4A-N, for more examples see Prószyński et al,. 2018). By statement "fits into such pattern in series of other species" I mean provision included into classical definition of a genus "diversity separated by a gap from other such series".

The second part of the above question is:
species "*petrensis"* C. L. Koch, 1837 **does not belong** to the genus Talavera because answers to the same question 1-3 are **"NOT"**. The true representatives of the genus ***Talavera*** G. W. Peckham & E. G. Peckham, 1909 looks like *Talavera aequipes* (O. Pickard-Cambridge, 1871) and its answers positively to the same questions 1-3 in the following way:
1 - frontal color pattern of live males (Fig. 2A) fits into such pattern in series of other live species of *Talavera* (Fig. 2F-G),
2 - male palps (Fig. 2B, for more see Prószyński et al,. 2018, or elsewhere) agree with structure of series of other species of *Talavera* (see Prószyński et al,. 2018), in particular by lack of coil of embolus,
3 - internal structure of epigyne (Figs 1C, 3G-H) fits into series of such structures in other species of *Talavera* (Fig. 4A-N, for more examples see Prószyński et al,. 2018).

Taxonomic discussion.
In taxonomy, diagnostic characters should be weighted by their universal occurrence in all species included into to a particular taxon. Striking *Euophrys*-like frontal color pattern of male *Euophrys petrensis* (Figs 1A) **does not permit to separate it from *Euophrys* pool of species (Figs 1D-K)**, but certainly excludes from entirely different pattern of *Talavera* (Figs 2A-G). Seemingly absence of tibial apophysis in palps is questioned by indistinct dark spire-like shadow, adpressed to (or possibly grown into) tegument of bulbus (Figs 3E-F) - that requires confirmation but, even if really absent, that can be just one more case of reductive tendency of apophysis in that genus. Internal structure of epigyne in *E. petrensis* (Figs 1C, 3G-H) resembles other European species by distinct circular extension of the copulatory duct, running peripherally around epigyne's window, similar circular extension, only less sclerotized, was documented already in dozens of species (Figs 4A-N, for more see Prószyński, Lissner & Schäfer, 2018: 26-74, also Prószyński 2003a: 48 and subsequent).

There could be more species in nature awaiting discovery. *Euophrys petrensis* is broadly distributed species (Europe, China, recently reported from Turkey [see Coşar & Danışman (2021:100]) of little known genus and resembles cases of distribution a single "relict" species turned into a series of species, subsequently discovered after further intense research. We can wait for results of more extensive study of that minute, ground living *Euophrys*-like fauna, possibly in environments resembling those in Turkey.

Potential advantages of color photographs is not fully exploited yet in taxonomic publications, due to biased attitude of both laboratory taxonomists and field macrophotographers. Taxonomists works on preserved collections and usually have limited access to color photographs of live species, their photo-documentation of preserved spiders is often unrecognizable, due to loss of diagnostic coloration. Macrophotographers of the other hand pursuit their own aims, and are not interested in sacrificing time for snapping additional photos in standard comparative poses. As a minimum, there are three standard positions of a live specimen necessary for species recognition, followed in laboratory by photographs of palp (two positions) and of internal structures of epigyne - cleared, stained (in Chlorazol Black E, which differentiate various degree of sclerotization), mounted in temporary slide. External view of epigyne could be also sometimes helpful. Preferably the above set of photographs should be taken from the same specimen.

Addition

Euophrys monadnock and *E. nearctica* are valid, separate species

WSC lost valid species ***Euophrys nearctica* Emerton, 1891**: 241, pl. 20, f. 2, synonymized by Edwards 1980 with ***Euophrys monadnock* Banks, 1895b**: 431, although Prószyński has documented invalidity of that Edwards' decision, corrected and documented in Prószyński, Lissner & Schäfer, 2018: 26, 43, f. 12B-C,E, 22D). Therefore I am forced to remember that case again. The documentation of specimens of both species is shown in the above **(Figs 4F-G-H - *E. nearctica*)**, facsimile of the original opinion of Edwards' (devoid of any documentation) is shown below.

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This is a PDF version of **PECKHAMIA 2(1): 11-14, December, 1980.** Pagination of the original document has been retained.

JUMPING SPIDERS OF THE UNITED STATES AND CANADA: CHANGES IN THE KEY AND LIST (4). G. B. Edwards

NEW SYNONYMIES and NEW COMBINATIONS are based on examination of types.

30. *Euophrys nearctica* Kaston 1938 = *Euophrys monadnock* Emerton 1891. NEW SYNONYMY. Delete 30.

Figs 6. Edwards (1980) facsimile of **the complete documentation** to synonymy of *Euophrys monadnock* with *E. nearctica*, dated 1980, accepted by World Spider Catalog (ver. 19.0, accessed on April 26th, 2018, and again on August, 18th, 2022), facsimile of the original description of *E. nearctica* - is reprinted at Fig. 33 in Pószyński, Lissner & Schäfer, 2018: 72, where **relevant diagnostic drawings of both species were also shown, repeated now in this paper as Figs 8A-C** (below).
SOURCE: Edwards (1980) Peckhamia 2(1): 12.

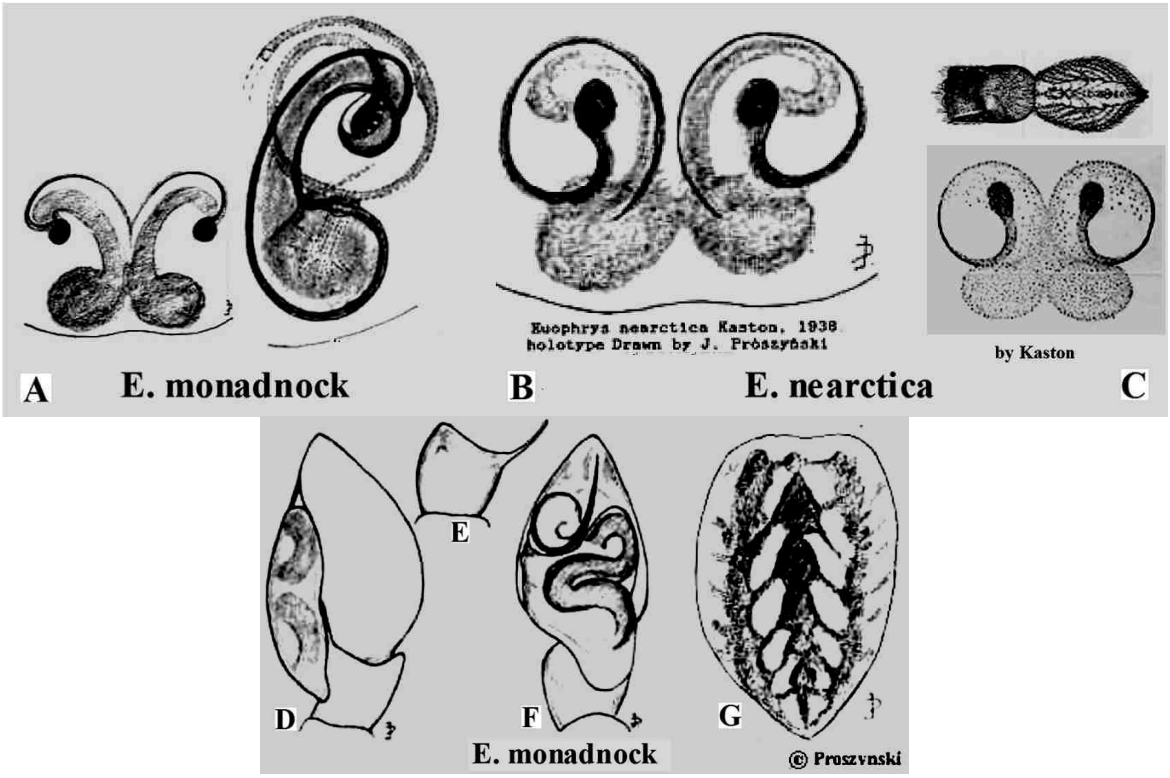
However, there appeared difficulty in acceptation of the above correction by WSC because of suspicion that I do not respect sufficiently publication of Dr. D. V. Logunov - the excerpt from the WSC is shown below.

Euophrys monadnock Emerton, 1891 World Spider Catalog Version 23.5

Taxonomic references

Euophrys monadnock Emerton, 1891: 241, pl. 20, f. 2 (Dmf).
Attus monadnock Banks, 1895b: 431.
Euophrys monadnock Peckham & Peckham, 1909: 515, pl. 43, f. 8 (mf).
Euophrys nearctica Kaston, 1938c: 187, pl. 9, f. 25-26 (Df).
Euophrys monadnock Prószyński, 1976: 150, f. 100, 149 (mf).
Euophrys monadnock Edwards, 1980: 12 (S of *Euophrys nearctica*).
Euophrys monadnock Logunov, Cutler & Marusik, 1993: 117, f. 6C, 7C, 14A-E (mf).
Euophrys monadnock Paquin & Dupérré, 2003: 194, f. 2163-2165 (mf).
Euophrys monadnock Prószyński, Lissner & Schäfer, 2018: 43, f. 12B-C,E, 22D (mf; S of *E. nearctica* rejected, contra Edwards, 1980: 11; not accepted here, because not discussing Logunov, Cutler & Marusik, 1993: f. 14C-E and Paquin & Dupérré

Figs 7. Facsimile of the WSC records of *Euophrys monadnock*, with derogative comment that "..rejected ... not discussing ... [papers of] Logunov ... Dupérré ... " (highlighting by J. Prószyński, that remark will disappear from WSC after editors will accept correction on *E. nearctica*). I reject that comment as untrue - the papers of Logunov et all., 1993, as well as Paquin and Dupérré, 2003 are irrelevant to the question of independent and valid species *Euophrys nearctica*, they even did not mention that name.



Figs 8. Ultimate arguments that *Euophrys monadnock* and *E. nearctica* are valid, separate species - as illustrated by internal structure of epigyne. A, D-F - ***Euophrys monadnock*** (epigyne *in situ* and spermatheca with ducts - cleared and stained, palp, dorsal abdominal pattern of male), B-C - ***Euophrys nearctica*** **(holotype,** *in situ*). C - same, drawn by Kaston, dorsal view and epigyne, the latter authenticate Fig. B).
SOURCES: A- B - Prószyński J. (1990) Internet, C - Kaston, B. J. (1938c). Bulletin of the Brooklyn Entomological Society 33: 187, pl. 9, f. 25-26.

After first description of these two species by Emerton, 1891 and Kaston, 1938 respectively, the next descriptions appeared in **Prószyński J. 1990p. Taxonomic revision of N American species of *Euophrys* and Talavera (Araneae: Salticidae). 9-11, fig. 16**. [[preliminary trial edition of a few copies for the purpose of soliciting comments from the experts in this field, sent also to D. V. Logunov]. These were

copied through the kind support of the Zoology Department, Eastern Illinois University. Charleston, Ill. June 1990, not mentioned by the WSC]. Put into Internet monograph from version November 2004 onwards. These descriptions are published now - below.

Euophrys nearctica Kaston, 1938

Material: 1 F "*Euophrys nearctica* Kaston, 1938. TYPE" "Old Orchard, Me, 26 Aug. 1937.Coll. D. S. Riggs". Coll. MCZ.

Remark: There are no clear cut color differences with *Euophrys monadnock*, these visible may be due to 50 years longer preservation of the holotype of *Euophrys nearctica*; whilst there are also no distinct differences in size and proportions, the only valid difference is in internal structure of epigyne. However, the differences, especially sclerotized ridge leading to copulatory opening may be not visible on less sclerotized epigyne. The epigyne of the holotype - the single specimen known to science was not cleared and mounted to spare it from damage.

Female.

Cephalothorax: pure light brown (whilst *Euophrys monadnock* has some olive grayish hue), slightly lighter dorsally, sides darker, eye field darker brown, presumably black in fresh specimens; dark ventral edge; sparse, minute colorless setae scattered over anterior eye field and part of thorax, in other areas presumably lost; no contrasting color pattern. **Abdomen**: there is indistinct and irregular pattern of delicate grayish brown network with weak median streak of similar color consisting of a number of fused triangles, followed on both sides (and separated from network) by a chain of light spots - a typical pattern for many *Euophrys* species and comparable with *Euophrys monadnock*, in which however the background is much darker and the spots clearly delimited, instead of a network are rather lines of small light spots; sides are lighter; it is not certain to which degree these differences are due to the post-mortem changes and fading during years of preservation. **Frontal aspect:** eye field and immediate surrounding of eyes I dark, rims of eyes I with indistinct and sparse whitish setae, more visible dorsally, clypeus brown with darker rim, almost bald, with a few inconspicuous dark setae; chelicerae light brownish gray, pedipalps yellow with tarsus and tibia darker yellow. **Legs** I brown with lateral surfaces of metatarsus, tibia and patella darker, only indistinctly lighter dorsally; tarsus, patella dorsally and femur ventrally much lighter yellow. Remaining legs deep dark yellow. Leg I: metatarsus with two pairs of ventral spines, longer than the segment itself, tibia with three pairs of ventral spines. V**entral aspect**: coxae dark yellow like legs, sternum light brown with darker rim, median area of abdomen behind epigastric furrow uniformly gray, separated by indistinct lighter dots from prey network pattern of sides; surfaces of lung-books strikingly darker, dark gray; they were as dark in *Euophrys monadnock* where remaining part of abdomen were also as dark. **Epigyne** resembles *E. monadnock*, however the spermathecae seems larger in comparison with length of channels and width of their loop; the most striking difference is the course of sclerotized ridge arriving at sclerotized median plate of the copulatory opening directly from behind, after making almost a complete circle (Fig. 8B-C, 4G-H), in *Euophrys monadnock* (Fig. 8A, 4F) it makes only anterior half of a circle (on preparation it looks like rather one and half a circle) and arrive from side; these details could be seen externally only on well sclerotized epigyne.

Measurements of BODY **and** LEGS							
	Length in mm	in % of Length cephalothorax	Segments of legs	Leg I	Leg II	Leg III	Leg IV
Length cephalothorax	1.70	100 %	tarsus	.37	.34	.43	.55
Length eye field	.77	45 %	metatar	.45	.42	.61	.92
Height cephalothorax	.80	47 %	tibia	.55	.45	.55	.87
Width eye field at eyes I	1.14	67 %	patella	.55	.50	.49	.57
Width eye field at eyes III	1.14	67 %	femur	.86	.76	.98	1.21
Width of cephalothorax at eyes III	1.21	71 %	Total of 5 segments	2.78	2.47	3.06	4.12
Length flat surface of cephalothorax	Length of ABDOMEN	Max. width of ABDOMEN	Total in % of leg I.	100 %	89	110	148
.25	2.09	1.41					

Euophrys monadnock Emerton, 1891

Material: 1) 1F *Euophrys monadnock*. Alberta : on HWY 9 between Cereal and Oyen, 10 km . W of jcn with HWY 41. 10 June 1986. W. Maddison, 86-032. MCZ (epigyne drawing and preparation)
2) 1F *Euophrys monadnock* ONTARIO : Parry Sound Distr., 14 km . S. of Pointe Au Baril Sta, on HWY 69. 27 May 86, W. Maddison 86. 86-012 MCZ (abdomen drawing).
3) 1M *Euophrys monadnock* California : San Bernardino Mts., end of Poop Out Hill Rd. at N. border of San Gorgonio Wilderness, 7700 ft . el. 30 June, 1985. W. Maddison 85-086. Coll. MCZ.
4) 1M *Euophrys monadnock* Canada ; La Sienne River . N. Banks Coll. MCZ.
5) 1M *Euophrys monadnock* N. H . Monadnock. June 22-27, 1924. Miss E. B. Bryant Coll. MCZ.
Comparative material:
1)FF *Euophrys aequipes*: England , Oxford , 23. VII. 1958. H.W. Levi. Coll. MCZ

Male

Remark. Striking contrast of a few white segments of legs (femora III -IV, tarsi I-II, pedipalps) with dark body and very dark legs I with ventral mane of black, broad, long setae along metatarsus, tibia and patella, with similar dorsal, much shorter and less distinct setae along metatarsus, tibia and a part of femur I. Such combination of white femora III-IV and dark remaining segments and body is unique within the genus, however white tarsi appear in several Palaearctic species.

Cephalothorax: dark brown or gray, ventral rim darker; eye field almost blackish; no contrasting color pattern. **Abdomen**: dark brown with six pairs of small and not contrasting lighter spots along median line. **Frontal aspect**: blackish brown, almost bald, a few unnoticeable minute colorless setae on rims on eyes I, without any contrasting pattern except whitish yellow pedipalps (with exception of basal 3/4rd of femur). Ventral aspect uniformly dark, brown or gray. **Legs** dark brown (in San Bernardino specimen slightly lighter) contrasting with white or yellowish white femora III-IV, tarsi I-II and pedipalps; legs I very dark with narrow black mane of broad long setae ventrally on tibia I - the longest at the mid length of the segment and gradually shortened towards both extremities, continued shortened along ventral surface of metatarsus and patella I, much shorter and less distinct along dorsal surface of metatarsus, tibia and part of femur I. According to Maddison (personal communication) the white femora of preserved specimens are orange on live specimen,

which resembles some species I collected in Israel. **Palpal organ** typical for a number of *Euophrys* species in shape and proportions; whitish yellow, with embolus coil flat anteriorly and very thin, transparent tibial apophysis, visible only under special angle or after separation of tibia from cymbium.

Female

Cephalothorax light grayish brown, slightly lighter dorsally and darker gray at lower sides; eye field almost blackish; no contrasting color pattern. **Abdomen**: general coloration dark with whitish spots: two rows of very small oval whitish spots (seven pairs in the studied specimen, another with less spots visible) along median dark streak consisting of fused triangles; followed by irregular darker submarginal streak and slightly lighter margin, this pattern however may be result of post mortem changes. **Frontal aspect**: eye field and immediate surrounding of eyes I dark, rims of eyes I with indistinct and sparse whitish setae, more visible dorsally, clypeus brown with darker rim and slightly lighter area just above rim (in one specimen pronouncedly whitish), almost bald, with a few inconspicuous dark setae; chelicerae light brownish gray, pedipalps yellow with tarsus and tibia darker; legs I dorsally light brown with prolateral surfaces of metatarsus, tibia and patella darker. **Ventral aspect:** coxae yellow, sternum yellow with brown rim, abdomen behind epigastric furrow stripped longitudinally dark brownish gray and whitish. Legs: dull dark yellow with darker setae, lateral surfaces of legs I and tarsi metatarsi III-IV darker. **Epigyne**: resembles *Euophrys nearctica* in general outline, however the spermathecae seems smaller and channels broader, the external sclerotized ridges, recently found to be diagnostic, arrive antero-laterally (figs 8A).

Measurements of BODY				
	MALE in mm	FEMALE in mm	MALE in % of L. cphth	FEMALE in % of L. cphth
Length cephalothorax	1.54	1.60	100 %	100 %
Length eye field	.74	.74	48 %	46 %
Height cephalothorax	.80	.86	52 %	54 %
Width eye field at eyes I	1.11	1.11	72 %	69 %
Width eye field at eyes III	1.05	1.08	68 %	67 %
Width of cephalothorax at eyes III	1.05	1.13	68 %	71 %
Max. w. cphth	1.05	1.13	68 %	71 %
Length flat surface of cephalothorax	rounded	1.11	-	71 %
Length of ABDOMEN	1.72	1.97		

Measurements of LEGS								
	MALE Leg I	FEMALE Leg I	MALE Leg II	FEMALE Leg II	MALE Leg III	FEMALE Leg III	MALE Leg IV	FEMALE Leg IV
tarsus	.37	.37	.37	.37	.43	.43	.55	.55
metatar	.55	.43	.43	.55	.68	.43	1.04	.92
tibia	.80	.55	.55	.80	.61	.55	.98	.86 :
patella	.55	.55	.49	.55	.55	.55	.52	.55
femur	1.05	.86	1.17	1.06	1.05	.98	1.30	1.17
Total of 5 egments	3.32	2.76	:3.01	2.64	3.32	2.94	4.39	4.05
Total in % of leg I.	100 %	100 %	91 %	96 %	100 %	106 %	132 %	147 %

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