ON THE DISTRIBUTION, MORPHOLOGY AND INTRASPECIFIC VARIABILITY OF *ERIOPHYES DRYADIS* ROIV. (ACARI, ERIOPHYOIDEA) [1]

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CHOROLOGY
MORPHOLOGY
INTRASPECIFIC
VARIABILITY
ERIOPHYOIDEA
ERIOPHYES
DRYADIS ROIV.

ABSTRACT : The description of *Eriophyes dryadis* Roiv. is supplemented : male and juvenile instars i.e. nymph I and nymph II are described. Some new morphometric data are given. Characteristics of 3 local populations (2 from Yugoslavia and one from Switzerland) are compared with the original description. Actual and past (Pleistocoenic) distribution of host plant *Dryas octopetala* L. as well as a distribution of eriophyid mite *Eriophyes dryadis* is presented. An explanation based on arctic-alpine disjunction is given.

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RÉSUMÉ : Sur la distribution, la morphologie et la variabilité intraspécifique d'*Eriophyes dryadis* Roiv. (Acari, Eriophyoidea). Dans le présent travail, les auteurs complètent la description de l'espèce *Eriophyes dryadis* Roiv. Ils décrivent le mâle et le stade juvénile (nymphe I et II) qui ne sont pas compris dans la première description de l'espèce et donnent aussi de nouvelles données morphométriques. Ils effectuent une analyse comparative de 31 caractères morphologiques dans 3 populations locales (deux de Yougoslavie et une de Suisse). La répartition actuelle de l'*E. dryadis* est mise en corrélation avec la répartition actuelle et celle du pleïstocène de la plante hôte *Dryas octopetala*, c'est-à-dire de son aréa arctique et alpine disjonctive.

INTRODUCTION

Arctic-alpine disjunction of plant and animal species area presents one of the most interesting biogeographic phenomenon of the western part of Euroasia. The formation of arctic-alpine disjunction area took place following the complex migration of flora and fauna during the Ice Age and Interglaciation. In general, at that time more or less specific populations covered an area of central Europe. Following the Ice Age, gradual migration which succeeded the regression of ice towards the arctic on one, and the mountains of central and southern Europe on the other hand, were the cause of area division and loss of mutual genetic connections. Today, reproductively isolated populations or areas in the arctic and the mountains of central and southern Europe, present extremely favourable objects for different comparative taxonomic, ecological and evolutional investigations of the flora and fauna.

The species *Eriophyes dryadis* (Roiv.) as the monophag of the host plant *Dryas octopetala* was first found and described in northwestern Finland, in the locality of Kilpisjärvi, Saana, approximately 800 m above sea level. The species was described as free living on the pilose undersurface of leaves (ROIVAINEN,1951).

The infested plants of this locality belong to the populations of more or less compact arctic part of the area. Our hypothesis was that, knowing the present distribution of the host plant as well as historical-phytogeographic factors inducing the formation of its arcto-alpine disjunction area, the

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presence of eriophyid mites *Eriophyes dryadis* in the populations of *Dryas octopetala* might be expected in the alpine parts of the disjunction. Our investigations aimed in this direction proved the hypothesis of occurrence of *E. dryadis* in a few populations of the species *D. octopetala* on the Balkan mountains and the Alps (Switzerland).

Also, the intention was, bearing in mind that the juvenile instars and male were not registered in the description of the species, to complete it.

Besides, the eriophyid mites *E.dryadis* have not been registered until now in new localities (DAVIS *et al., 1982*; BOCZEK, unpublished Supplement of the Catalogue of Eriophyid Mites, 1991). The only information relating to the original description has been included in the key given by FARKAS (1965).

Having at our disposal the samples of 3 local populations of *E.dryadis* the intention was to compare their basic morphometric and meristic characteristics with the original description in order to get an idea of intraspecific variability.

Morphological variations in eriophyid mites have been studied in *Vasates lycopersici* (Massee) (LAMB,1953), *Aceria tulipae* K., *A, tenuis* (Nal.), *A. tritici* Shevtchenko (SHEVTCHENKO *et al.*, 1970), *Vasates fockeui* (Nal. et Trt.) (BOCZEK *et al.*, 1984), *V. schlechtendali* (Nal.) (BOCZEK and KOZLOWSKI, 1985), *Epitrimerus taraxaci* Liro (PETANOVIĆ, 1990).

MATERIALS AND METHODS

The collection of the mites was made by the authors as the result of the surveys carried out at Durmitor and Šarplanina mountains in Yugoslavia and Swiss Alps. The slides have been done under stereoscopic binocular microscope using Heinze's mounting medium. Slides were studied under phase contrast microscope and 1250 x magnification.

Ten individuals were measured in each population for morphological variation analysis. Morphometric and meristic characters of *E. dryadis* Roiv. populations from two localities in Yugoslavia and one from Switzerland are compared with the original description (population from Finland) and some additional measurements are given in Tab. 1.

MORPHOLOGY AND INTRASPECIC VARIATION

All of the essential characteristics, emphasized in differential diagnosis, i.e. number of rays of featherclaw, shape of dorsal tubercles, ornamentation of dorsal shield etc., are similar to the description given by ROIVAINEN, 1951 (Fig. 1). Anyhow, some differences should be mentioned. In original description mites were yellowish-orange in colour; shield design of 5 longitudinal lines in midfield, shield sides ornated with numerous micrograins mostly in longitudinal rows. In our populations, mites were rather pinkish in colour. Shield ornamentation of one complete median line, two complete admedian lines and two submedian lines on anterior 2/3 of the shield on each side, as well as numerous micrograins laterally.

According to the data presented in Tab.1, practically there are no differences between Yugoslav and Swiss populations. But, significant differences in length and width of body, length of dorsal shield and setae, distance between dorsal tubercles, length and width of female genital coverflap, length of hindcoxal setae etc., between these populations and original description data (Finish local population) may be the consequence of different preparation procedure (?) as well as taxonomic distance between alpine (high mountain) and arctic populations.

Differences in some meristic characters (for example in number of ribbs on female genital coverflap 8 or 10, number of opisthosomal rings, 61-70), may also be the result of intraspecific variability, i.e. morphological differences between conspecific individuals and populations, as well as the possibility of taxonomic differences on subspecific level. The proof of this hypothesis should be given in more extensive work.

Bearing in mind that the description of *Eriophyes dryadis* Roiv. is uncomplete we supplement it.

Male : 108 μm long, 39 μm wide. Dorsal shield 24 μm long, dorsal tubercles 13 μm apart, dorsal setae 19 μm long with 71 opisthosomal rings; genitalia 10 μm wide.

Nymph I : 76 μm long, 27 μm thick; rostrum 14 μm long, chelicerae 9 μm long. Dorsal shield 18 μm long, dorsal tubercles 5 μm apart, dorsal

No	Character	Durmitor	Šarplanina	Swiss Alps	Saana, (ROIVAINEN,1951)
1	length of body	132 (121-137)	123 (117-131)	126 (126-132)	150-160
2	width of body	42	45	40	38-40
	thickness of body	40	48	45	—
4	length of rostrum	18	19	18	20-21
5	length of chelicerae	16	16	16	16-17
6	length of dorsal shield	22 (18-25)	22 (18-23)	23 (22-24)	29
7	distance between dorsal tubercles	(11-12)	(12-14)	(10-13)	18-19
8	length of dorsal setae	22 (18-27)	19 (18-23)	21 (19-31)	33-35
9	length of first legs	23	23	25	24
10	length of fore fermur	7	6	7	—
11	length of fore genu	4	3	4	—
12	length of fore tibia	5	5	5	6
13	length of fore tarsus	4	4	5	5
14	length of fore claw	7	7	6	8
15	number of rays of featherclaw	4	4	4	4
16	length of hindleg	19	17	18	—
17	length of hind tibia	4	3	4	—
18	length of hind tarsus	5	4	5	—
19	length of hind claw	8	7	7	—
20	length of hindcoxal setae	18	24	19	30
21	length of sternum	7	7	—	9
22	length of lateral setae (on sternite)	15 (11.)	11 (13.)	11 (11.)	15 (11-13.)
23	length of I ventral setae (on sternite)	18 (25.)	13 (26.)	17 (23.)	24 (25.)
24	length of II ventral setae (on sternite)	10 (40.)	7 (41.)	9 (37)	10-12 (36-40.)
25	length of III ventral setae (on sternite)	16 (62.)	12 (60.)	13 (56.)	20 (5-6 from the rear)
26	length of setae accessoriae	4	5	4	6
27	length x width of epigynium	8 x 16	10 x 17	11 x 15	13 x 16-18
28	length of genital setae	12	13	12	8
29	distance between genital tubercles	11	9	11	—
30	number of striae of female genital coverflap	8	8	8	(10?)
31	number of opisthosomal rings	70	68	66	(56-60) + 5

TABLE 1 : Morphometric and meristic characters of *Eriophyes dryadis* Roiv. from Yugoslavia, Switzerland and Finland (in μm).

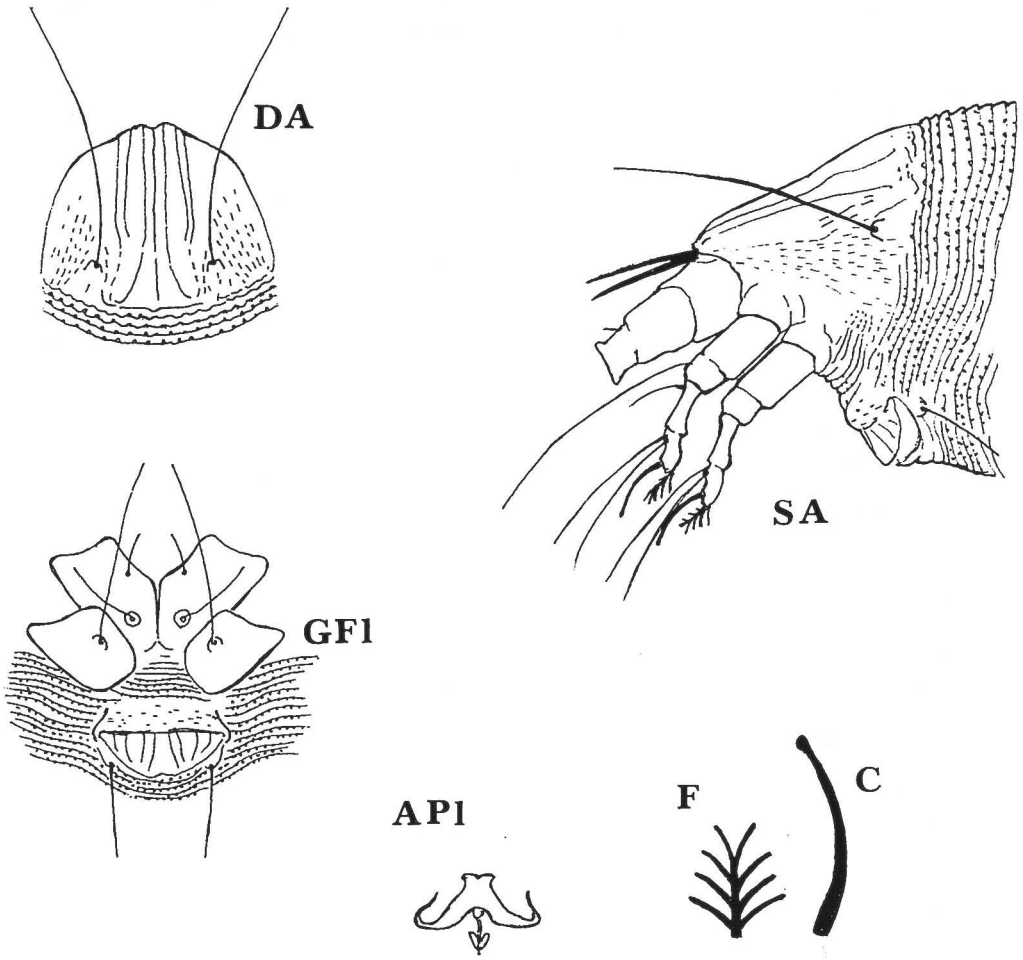

FIG. 1 : *Eriophyes dryadis* Roiv.
DA. — Dorsal view of anterior section of the shield. SA. — Side view of anterior section of mite. GFl. — External female genitalia. APl. — Internal female genitalia. F. — Featherclaw. C. — Claw.

setae 9 µm long. Foreleg 14 µm long, featherclaw 4-rayed ; hindleg 11 µm long. Opisthosoma with about 57 microtuberculate rings.

Nymph II : 90 µm long, 36 µm thick, rostrum 15 µm long, chelicerae 13 µm long. Dorsal shield 21 µm long, dorsal tubercles 11 µm apart, dorsal setae 19 µm long. Foreleg 22 µm long, hindleg 16 µm long. Opisthosoma with 62 microtuberculate rings. Genital setae on sternite 11.

CHOROLOGY OF THE HOST PLANT *Dryas octopetala* L. AND *Eriophyes dryadis* ROIV.

The species *Dryas octopetala L.* (Fam. Rosaceae) is a typical representative of the glacial relict of the arctic-alpine flora. The species encompasses an area of circumarctic region on one, and the mountains of western Euroasia from the Pyrenees, across the Alps, the Carpatian and the Balkan mountains,

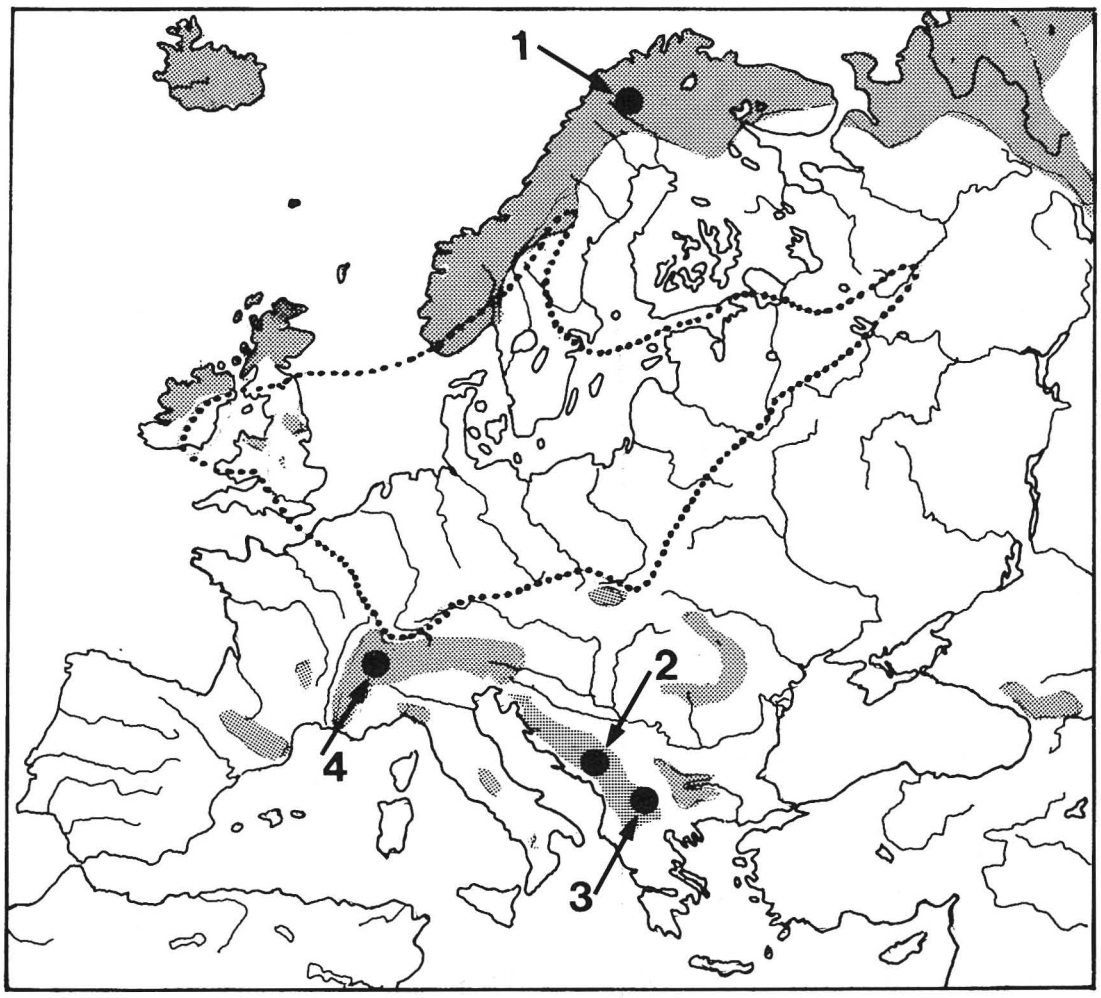

FIG. 2 : Actual (shaded area) and Pleistocoenic (dotted line) distribution of *Dryas octopetala* (according to HULTÉN, 1959., slightly modified). Localities of eriophyid mite *Eriophyes dryadis* are signed by arrows : 1 Locus classicus, Kilpisjärvi, Saana, Finland ; 2 mt. Durmitor (Sedlo, Prutaš, Savin kuk) ; 3 mt. Šarplanina (Crvene Karpe, Piribeg) and 4 Val de Ferre (Swiss Alps).

reaching Caucasia on the other hand (Fig. 2). The former area of this species in the Pleistocen (Würm) encompassed a relatively compact region of central Europe (Fig. 2) and its formation was due to the migration of the populations from the Arctic towards the south corresponding the movement of ice cap from north Europe towards south. Due to the gradual withdrawal of glaciers towards northern Europe and the mountain peaks of western parts of Euroasia, the populations of *D. octopetala* separated losing thereby the genetic connections and forming what is known today as the arctic-alpine area of this species. Therefore, it is important to emphasize the arctic origin of the species *Dryas octopetala* pointing out that the alpine part of its area was formed almost exactly following glaciation and today it is limited to the glacial-refugial areas of high mountains in central and southern Europe.

On the basis of the investigations relating to high mountain mite fauna the species *E. dryadis* was found in a few localities in the scope of the alpine disjunction of the host plant *Dryas octopetala* : 1) mt. Durmitor (Sedlo, Prutaš, Savin kuk), 1950-2300 m of altitude; 2) mt Šarplanina (Crvene

Karpe, Piribeg), approx. 2250 m of altitude ; 3) Swiss Alps (Val de Ferre, La Fouly), 1700-1800 m of altitude (Fig. 2).

Discussion and conclusion

The eriophyid mite *Eriophyes dryadis* Roiv. was first found and described in Finland on the host plant *D. octopetala L.* (Roivainen, 1951). On the basis of our investigations the eriophyid mite *E. dryadis* was found in the scope of a few populations of the host plant *Dryas octopetala* in the mountains of western and central parts of the Balkan peninsula (mt. Durmitor, mt. Šarplanina) and the western Alps in Switzerland (Val de Ferre). These investigations prove the hypothesis of the arctic-alpine disjunction of *E. dryadis's* area as well as of its glacial age and coevolution with the host plant *Dryas octopetala.* Bearing in mind the arctic origin of the host plant, reaching central Europe in the Ice Age period and spreading to the mountains of central and southern Europe at the end of glaciation, it was possible to claim with some confidence that this host plant migration was followed by the eriophyid mite *E. dryadis.* The formation of the disjuncted area of the species *E. dryadis* was thus enabled being a rare example biogeographically conditioned, especially relating to glacial flora and fauna.

Having in mind the former distribution of the species *E. dryadis* its presence might also be expected in the population of other parts of the arctic and the mountains of central and southern Europe. Of significant interest is the dispute over the fact whether this mite species might also be found living on other arctic species belonging to the genus *Dryas (D. drumondii* and *D. integrifolia)* distributed in the arctic parts of North America or are these plants hosts to certain related species of the genus *Eriophyes*?

For the time being intraspecific variability estimated in the species *E. dryadis* at the level of morphological characteristics might be explained as individual variability. It is interesting to note that bearing in mind the geographic isolation (aloptry) of arctic and alpine populations of *E. dryadis* one might speak of the differences at the intraspecific, i.e. subspecific level whereby the necessity for greater number of arctic and alpine populations with greater number of analyzed individuals is stressed.

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