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Considerations about proposed synonymy of some *Papilio alexanor* subspecies (Lepidoptera: Papilionidae)

Maurizio BOLLINO and Giovanni SALA

Dr. Maurizio BOLLINO, Via Rapolla 24, I-73100 Lecce, Italy
Dr. Giovanni SALA, Via Panoramica 4/A, I-25087 Salò (BS), Italy

While we were finishing a paper about a general revision of systematics and biology of *Papilio alexanor* ESPER, some articles about this species (NEL 1992, EITSCHBERGER 1993, HANISCH 1993, DAVID & SANETRA 1994) were published in different journals. We were particularly surprised by some taxonomical considerations found in DAVID & SANETRA (1994). One of us wrote to M. SANETRA about his co-authored article and making critical comments concerning their paper. M. SANETRA's reply convinced us that our German colleagues had a point of view different from us and induced us to write this short note with the aim of giving our opinion on the subject.

Our first consideration starts from the definition of subspecies as apparently accepted by DAVID & SANETRA. Reading DAVID & SANETRA (1994) and M. SANETRA's written reply to us, we concluded that they agree with a very restrictive concept of subspecies, it being surely more adequate if applied to a modern concept of biospecies. As DAVID & SANETRA did not clearly state their subspecies concept in their article, we deduced it from M. SANTERA's reply. In fact M. SANETRA underlines in his letter that morphological differences are not enough to describe a subspecies, but it would be valid if different habits and foodplants would be found. Even though the concept of subspecies is rejected by some researchers, it is widely accepted by most (both professional and amateur) entomologists, as frequently representing a useful criterion to indicate a local morphological constant variation within a biospecies. Moreover, morphology, from all given meanings of the word, is, in itself, expression of a gene pool. Morphological differences, if present alone, cannot be discarded, in our opinion, especially if present and constant on a wide area, so representing the "visual markers" of the genic history of the biospecies. Any genic modification, leading to speciation, can be or not expressed by consequent morphological and/or ecoethological modification within a population, therefore, in our opinion, the presence of both (morphological and eco-ethological) modifications is not always necessary to justify the validity of a given subspecies.

The consequences of DAVID's & SANETRA's restrictive concept of subspecies are some taxonomical decisions which sink in synonymy some subspecies of *Papilio alexanor*. Their taxonomical decisions affected two universally recognized subspecies: *judaeus* STAUDINGER 1884 and *atticus* VERITY 1911, as well as two recently described by the present writers: *radighierii* SALA & BOLLINO 1991 and *eitschbergeri* BOLLINO & SALA 1992. On the other hand, by rigidly applying their rule, DAVID & SANETRA consider ssp. *destelensis* NEL & CHAULIAC 1983 as valid, due to its different habits and foodplant. Ssp. *eitschbergeri* is considered by them to be a synonym of *judaeus* (with *magnus* VERITY, *atticus* VERITY, *adriaticus* SCHAWERDA and *graecus* SCHMIDT) because the researchers have not found any obvious striking difference in the life habits of the new subspecies. In fact DAVID & SANETRA report "*Ferula*-Arten" as used in the Balkans and the Middle East as foodplants of *Papilio alexanor judaeus* STAUDINGER (sensu DAVID & SANETRA). Reports of *Ferula* sp. as foodplant of Greek and Turkish populations are frequently found in literature (see DE FREINA 1983, LEESTMANS & ARHEILGER 1987, and others), but this is frequently due to incorrect identification of Greek (and sometimes also of Turkish) foodplants. Observations about the biology of some populations of *Papilio alexanor* in the Balkans and the Middle East were carried out either by us directly or by some colleagues and subsequently examined by a botanist. To clearly report the results, we are here listing our available information for each subspecies, considered as valid by us.

1) *Papilio alexanor atticus* VERITY.

Distribution: former Western Yugoslavia up to Istria, Western continental Greece, Peloponnesus.

If the biology of populations of *Papilio alexanor* is not known and observations at first-hand are not available, bibliographical sources can be easily misinterpreted. DE WORMS (1972), for example, reports caterpillars of *Papilio alexanor* found on a "tall umbelliferous plant" at Mistrà (Greece, Peloponnesus). If biology of local population of the species is not known and personal observations have not been carried out, it is easy to suppose the "tall umbelliferous plant" as belonging to genus *Ferula*. At Mistrà, on the contrary, we found caterpillars of *Papilio alexanor atticus* feeding on *Pimpinella* sp. (in early May) and *Opopanax hispidus* (FRIV.) GRIS. (in June). *Opopanax hispidus* certainly is a "tall umbelliferous plant", but is not a *Ferula* species. *Ferula communis* grows in the same biotop also, but we never observed any *P. alexanor* caterpillar on its flowers. In addition, *Ferula* sp. (pers. obs.) is rather rare between Delphi and Arachova (Central Greece), while in May 1985 and 1990 we found caterpillars of *P. alex-*

anor feeding on *Pimpinella* sp., and in early June 1994 a few caterpillars were feeding on *Opopanax* sp. (probably *chironium*) and many on *Ferulago* sp.

LEESTMANS & ARHEILGER (1987) illustrate full-grown caterpillars of *alexanor* from Chelmos Mt. (Peloponnesus) as feeding on *Ferula communis*. A critical analysis (carried out by a botanist) of the photograph shown in the paper confirms that the plant illustrated is indeed *Opopanax* sp. Furthermore, personal observations in May 1985 and 1990, June 1994 and July 1982 demonstrated that *Ferula* sp. is exceedingly rare on Chelmos (at least in *P. alexanor* biotopes). In addition KÖSTLER (1991), from the same area, carefully reports as local foodplant *Opopanax hispidus* and tentatively *Pimpinella* sp. or *Seseli* sp. *Opopanax* sp. is also used as foodplant on Erymanthos Mountains (pers. obs., June 1994). On Pindus Mountains (Greece, Epirus) we found many *P. alexanor* caterpillars feeding on *Opopanax* sp. (some on *Ferulago* sp. also) in July 1992 and 1993, and near Parga (Greece, Epirus), where *Papilio alexanor atticus* is rather common, both *Pimpinella* sp. and *Opopanax* sp. are present, while *Ferula* plants were never observed during our visits on May 1990, July 1991 and 1992 and August 1992.

2) *Papilio alexanor eitschbergeri* BOLLINO & SALA 1992.
Distribution: Greece (Samos and Lesbos Islands), Western Turkey.

SCHMIDT (1989 a) reports *Pastinaca sativa* as foodplant of *Papilio alexanor* on Samos Island (Greece). GARREVOET (in litt.) informed us that he does not agree with this, but states unequivocally the species feeds on *Opopanax* inflorescences. KÖSTLER (1991) arrives at the same conclusion by examining a photo taken by SCHMIDT himself on Samos. Dry samples of a Turkish *Opopanax* species were supplied to us by Mr. Armin BOLLMAN, who bred *alexanor* from caterpillars collected near Izmir (western Turkey) on this plant. Finally Prof. K. ROSE (in litt. and pers. comm.) found populations of *alexanor* feeding on true *Ferula* sp. near Antalya (Southern Turkey).

3) *Papilio alexanor judaeus* STAUDINGER 1884.
Distribution: Israel, Lebanon, Jordan, Syria(?).

NAKAMURA & AE (1977) report *Ferula tingitana* L. and *Heptaptera anisoptera* TUTIN as foodplants used by *P. alexanor* in Israel.

Our list could be much longer if we indicated all species of *Ferula* reported in literature for Easten Turkish, Caucasian and Uzbekian *P. alexanor* populations. We have given all the information available on the

three subspecies cited above just to underscore that *Papilio alexanor* has also oligophagous populations, not only rigidly monophagous ones. DAVID & SANETRA apparently hold a contrary view. If we were to strictly apply DAVID's & SANETRA's concept of subspecies, both *atticus* VERITY and *eitschbergeri* BOLLINO & SALA would be subspecifically distinct from *judaeus* STAUDINGER, and validly considered as distinct subspecies from each other, due to their different morphology and biology, and the presence of such an important ecological barrier as Aegean Sea between them.

About the oligophagy of *Papilio alexanor,* the adoption of different foodplants can be considered as simple expressions of the species' plasticity and adaptation to different environmental conditions. *Pimpinella* sp., *Opopanax* sp. and *Ferulago* sp. present an echeloned blooming, and *Papilio alexanor atticus,* at least in Greece (we do not have complete information about phenology of populations from Albania and former Yugoslavia), has a prolonged emergence period. During 1994, in the same biotop (Delphi, Central Greece), fresh specimens were observed from April (ROSE, in litt.) to June (pers. obs.). Laying eggs on different foodplants, with echeloned blooming, may offer the same reproductive opportunities both to early and to late emerged specimens. Such adaptation was first underlined by NAKAMURA & AE (1977) for ssp. *judaeus,* writing "The main food plant is *Ferula,* although early females tend to oviposit on *Heptaptera* since it flowers about 2 weeks earlier than *Ferula* in the same localities". If ecological and biological data can be used to confirm or deny the validity of a given species or subspecies, they cannot, in our opinion, be always used with the same valency, especially if referred to subspecies only. Even if, for example, *Anthocaris damone* BOISDUVAL in Southern Italy and Southern Turkey uses the same foodplant (*Isatis tinctoria*), and flies in similar biotopes (pers. obs.), nobody would ever assert that both populations belong to the same subspecies for this reason only. Another example is offered by some populations of Italian *Zerynthia polyxena* [DENIS & SCHIFFERMÜLLER]. Even if most of Central Italian populations use as host plant *Aristolochia rotunda* and/or *A. pallida,* few populations near Modena shifted their preference to *Aristolochia clematitis* (F. CRESPI, pers. comm.). Caterpillars of such populations are easily bred on *A. rotunda* or *pallida,* while caterpillars of "normal" populations reject *A. clematitis,* or, if forced to eat it, die. Such food-plant adaptation alone does not justify, in any case, to consider the *A. clematitis* feeder populations as belonging to a different subspecies for this reason only.

Another criticism by DAVID and SANETRA of our opinions was probably our assertion that caterpillars of *Papilio alexanor radighierii* were found on *Trinia glauca,* while they report *Ptychotis saxifraga* from its type locality near Valdieri in Val Gesso (Northern Italy). Our field observations were carried out in the type locality on June 1988-1990, while DAVID & SANETRA apparently visited the same biotop on 9th of July 1993. We submitted dry samples of local foodplant to Dr. Piero MEDAGLI (University of Bari, Botanical Institute), who informed us about their identity *Trinia glauca* flowers in May/June, while *Ptychotis saxifraga* in June-August (PIGNATTI 1982). We have just demonstrated that *Papilio alexanor* can use different foodplants in the same locality, so we do not understand why the same could not apply in Valdieri, justifying the discordance of the observations made by us and DAVID & SANETRA with the different period during which the observations were carried out.

Furthermore DAVID & SANETRA consider *Papilio alexanor destelensis* as a valid subspecies because it shows different habits using as foodplant *Opopanax chironium* instead of *Ptychotis saxifraga.* But Mr. J. LUX from Nice, France (in litt.), informed us that near Bouyon Les Ferres and Courmes (France, Alpes Maritimes) the local population of *Papilio alexanor* ssp. *alexanor* uses both *Opopanax chironium* and *Ptychotis saxifraga* as foodplants, the former growing on wet, calcareous soils near Bouyon, the latter on dry siliceous ones above Courmes, offering further confirmation of species' ecological plasticity. We do not wish to assert with this that *Papilio alexanor destelensis* NEL & CHAULIAC is a new synonym of *Papilio alexanor alexanor* ESPER, but rather to state that this information only further demonstrates that we must be careful in appraising restrictive concepts of subspecies, which so often turn out to be merely plausible.

Reading DAVID's & SANETRA's detailed paper, so precise in some sections, we were surprised of some superficiality in the systematic sections. Strictly taxonomically speaking, their sinking in synonymy of ssp. *magna, attica, adriatica, greacus* and *eitschbergeri* with *judaeus* is not supported by any comparison with reference material, but only by reference to bibliographical, uncontrolled, reports of foodplants. As they, very acutely, underline that frequently bibliographical reports of food-plants are not reliable, we do not understand why they only use such sources to justify their synonymies.

To conclude, we trust that our ongoing research will be of some use to all interested in the field of *Papilio alexanor.* All dissertations can only convince us of apparently reaching the "truth": it will be hidden in *P. alexanor*'s genoma until .

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