

**PALAEOLOGICAL CONSIDERATION ABOUT
A *PARACORYMBIA HYBRIDA* (REY, 1885) RELICT STATION
(COLEOPTERA, CERAMBYCIDAE, LEPTURINAE)**

by Francesco VITALI^o

^o via Roma 7/12, I-16121 Genova, Italia

Abstract

Recent and Würm distribution of **Paracorymbia hybrida** (Rey, 1885) in the Alps are discussed in connection with spread of its original host *Abies alba* Mill. and of closely related species of the genus **Paracorymbia** Miroshnikov, 1998.

Key words

Coleoptera, Cerambycidae, Lepturinae, Lepturini, **Paracorymbia**, Alps, Apennines, spread, palaeogeography.

Résumé

La distribution alpine actuelle et pendant la période glaciaire würmienne de **Paracorymbia hybrida** (Rey, 1885) est traitée en relation avec celle de sa plante-hôte originelle *Abies alba* Mill. et des autres espèces affines du genre **Paracorymbia** Miroshnikov, 1998

Mots-clés

Coleoptera, Cerambycidae, Lepturinae, Lepturini, **Paracorymbia**, Alpes, Apennins, chorologie, paléogéographie.

Introduction

In July 2000 I collected in the Parmesan Apennine (Italy, Emilia-Romagna reg., Parma prov., Mt. Maggiorasca group, Mt. Nero, 1750 m., on inflorescence of *Laserpitium siler* L., *Seseli libanotis* Koch, *Pimpinella* sp., *Polygonum bistorta* L., *Cirsium* sp. and *Scabiosa lucida* Vill., in forest of *Abies alba* Mill. and *Pinus mugo* Turra) numerous specimens of **Paracorymbia hybrida** (Rey, 1885), resulting at the time the first Apennine finding of this species.

Remarks

Such specimens have an average length (9-12 mm) lower than alpine ones in my collection (10-13 mm) and a more testaceous coloration. This fact seems occur

also to some other Lepturini-species of the Apennines, such as **Anastrangalia** or **Paracorymbia fulva** (DeGeer, 1775).

Mt. Nero is localised near Mt. Maggiorasca and Mt. Bue is located at the northern limits of the Regional Natural Park of the Aveto Valley. This area is characterised by a partly relict flora and fauna, with many boreal-alpine species, but unfortunately in regression phase and for this reason under safeguard. The fir forests of Mt. Nero and of the near surroundings are often reputed as of anthropic origin and not as of relict one (BERNARDELLO, *in litt.*); nevertheless, the presence of **Paracorymbia hybrida**, confirms its natural origin.

Discussion

Preimaginal biology of **Paracorymbia hybrida** is related to the dead wood of conifers: *Pinus* sp. (likely only *P. sylvestris* L. and *P. nigra* Arnold), *Larix decidua* Mill., *Picea abies* (L.) and *Abies alba* Mill. Also deciduous trees are reported by VIVES (2000), but they are probably due to tertiary or occasional adaptations (if not to mistakes with other species), since they are the only records from about 150 years of scientific researches.

Nevertheless, fir seems to be its original host, while other plants could be a secondary adaptation. In fact, only the Western European areal of such conifer is almost exactly superposable on that of this beetle. Spruce is not in the Pyrennes and it had not been in the Apennines during the Würm, larch is not in the Pyrennes and in the Apennines; black pine and its forms are related to warmer climates and its relict spread is not related with **hybrida**. The species related to Scots pine have different spread and palaeological history (coming from Middle Asia) not related with **hybrida**. Moreover, the particular spread of this cerambycid could be explained only through a close correlation with the palaeological history of fir.

By following the spread of its host in relation to climatic and geological past events, it is possible to reconstruct its palaeological history too. Unfortunately, while pollen diagrams let reconstruct past floristic succession, the study of correlated fauna is only hypothetical, because of the lack or total missing of its fossils.

Ecology of fir

The areal of fir (SCHAUER & CASPARI, 1975; STRASBURGER, 1982; PIGNATTI, 1984) is located between sub-alpine and hill horizon (variable altitudes among 800-900 and 1800-2000 m). Moreover, it is subject to several limiting conditions, since it is a very exacting plant with regards to the climate and the ground. Less humid grounds or dry climates favourite other plants: fir is subject to the prevailing concurrence of beech in calcareous grounds (until 1200 m),

spruce and larch, prevail in the dolomites of Northern Alps, while Scots or black pine prevails in Middle and Southern Alps.

In Northern and Middle Alps the beech-spruce-larch horizons (or pine-spruce-larch in dryer valleys) let to fir only few relict stations (at 1200-1400 m) with spruce, or also lonely on high humid marlaceous grounds. In the Southern Alps fir can survive at 1000-1300 m (with beech), or in exceptionally humid zones until 1750 m (otherwise prevails spruce and/or larch). In the Apennines fir can prevail only in under mountain horizon of the *fagetum*, otherwise it is supplanted by beech. Nevertheless, according to many botanists (FENAROLI & GIACOMINI, 1957; PIGNATTI, 1984), most Apennine fir forests such as Abetone, Vallombrosa, and Camaldoli have been mostly reforested by the man for many centuries to detriment of beech. In fact the local increase of the seasonal average temperature makes the grounds more and more arid and this conifer more and more rare.

Therefore, it results a fragmentary spread, especially related to humid siliceous grounds and to an altitude of 1000-1750 m, which can be found in the Pyrennes, the Massif Central, the Jura, the Vosges, the Alps and in few other particularly favourable, isolated stations of the Apennines, until to Calabria

Palaeological history of *Paracorymbia hybrida*.

Also ***Paracorymbia hybrida*** is generally diffused at 800-2000 m (at shorter altitudes in cold Swiss valleys), in the Pyrennes, the Massif Central, the Vosges, the Jura, the middle and the west of the Southern Alps (ALLENSPACH, 1973; VILLIERS, 1978, SAMA, 1988; VITALI, 1999). This areal is south-eastward limited by the Dolomites and northward by the line of calcareous Northern Alps (from Bern's Alps to Hohe Tauern), while records up to north-west of such line are to be related to the Vosges populations. Along the Ligurian mountains it reaches, through more or less disconnected stations, the Mt. Beigua surroundings (Savona distr.), which already constitutes the extreme limit for many boreal-alpine species; then it reappears in an isolated fir forest of the Ligurian-Parmesan Apennine. With respect to other Western European ***Paracorymbia***-species, ***hybrida*** has an intermediate areal, wider in middle and southern French mountains.

Fir had during the Würm (80.000-12.500 BP) a very relict spread in Northern and Southern Alps, while it had widespread in all Apennines instead. Northward expansion and southward regression began in the early Post-Glacial reducing it to some isolated middle-altitude stations (FENAROLI & GIACOMINI, 1957; STRASBURGER, 1982).

From pollen diagrams (BRUGIAPAGLIA, 1997), it results that fir of Italian Western Alps arrived from the refuges of the Parmesan Apennine, where it had present about 12.370 BP. By following the ice regression, fir transited

through Liguria and reached the Maritimes Alps (Col de Tende surroundings) about 9.500 BP, the Cozie Alps about 9.000 BP and the Graie Alps about 8.000 BP. The colonisation had been slower in the French Alps: fir reached the High Alps about 9.000 BP, the Savoy about 8.000 BP and the High Savoy about 7.500 BP.

Spread velocity of fir seems to been about 70-80 m/years, but it was higher across the Cozie Alps (150 m/years), perhaps for the introduction of French populations; then it slowed, since warmer climate has favoured other tree species.

This Apennine record suggests that **hybrida**, has been present in the fir forests in the Ligurian-Parmesan Apennine during the Würm. The species has not been present in the Alps, for the ice presence, but it has been also in French refuges (connected from the Italian ones) in Provençal coast and in the Pyrennes, in zones having at the time a wider southwards extension due to the sea lowering (90-150 m according to the authors).

This beetle expanded later in the early Post-Glacial in Western Alps following fir or remained locally entrapped in some Apennine relict stations. For its expansion in the Western Alps, the same dates of fir could be reputed reasonably correct. It is also possible to suppose another alpine colonisation coming from the Provençal refuges, through Col de Tende, the lowest (1908 m) and nearest pass to such refuges; these populations could met here the Apennines ones about 9.500 BP.

Fir has been in Lumbardy already 13.200 BP (BRUGIAPAGLIA, 1997), nevertheless **hybrida** had not been present here, otherwise today it could be also in far Eastern Alps, for the connection between Lumbard and Eastern refuges (FENAROLI & GIACOMINI, 1958). If the average velocity of about 70-80 m/year through the Alps is reputed correct and constant, **hybrida** reached Lumbardy only about 6.500 BP and the South Tyrolese mountains (its least eastern limit) about 4.000-3.500 BP. Nevertheless, the contribution of fir populations come from Lumbard and Eastern refuges could modify such dates.

Recent missing of **hybrida** in North Tyrol and in Friuli is probably due to factors limiting the further spread of fir carrying this beetle at the South Tyrol limits: height of the passes (Grödner Joch, Sella, Pordoi and Falzarego are all up 2000 m), the North Tyrolese calcareous mountains, presence of areas among Bozen, Meran and Brixen poorer in vegetation and dolomites of Dolomites mountains. Since the expansion of **hybrida** had occurred eastwards through the Alps (this explains the record rarefaction toward this direction), it finds difficulties to reach other favourable habitats.

Palaeological history of related Paracorymbia-species

The missing of **Paracorymbia simplonica** (Fairmaire, 1885) and

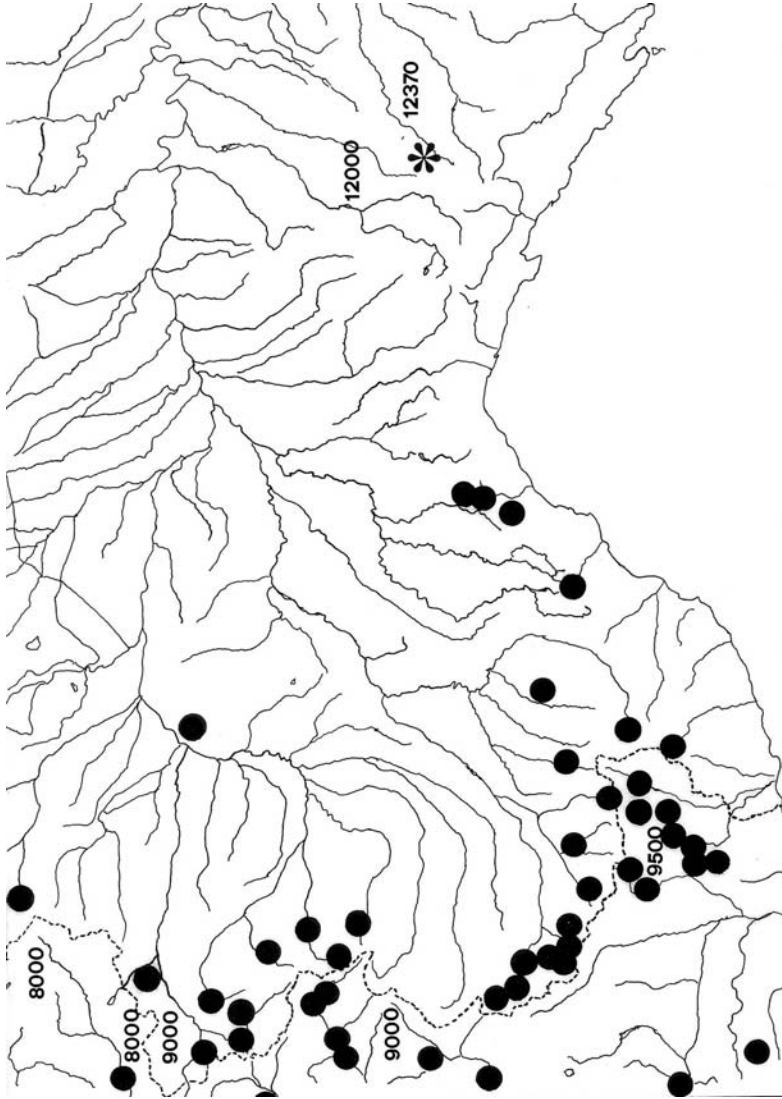


Fig. 1. – Actual and past distribution of *Paracorymbia hybrida* (Rey, 1885) according to the authors and the consulted collections (explanation in the text.)

Paracorymbia maculicornis (DeGeer, 1775) in the Apennines suggests that both species had been confined in the forests beyond Italy during the Würm and they have colonised the Italian Alps only after the ice regression. At the present, reasons to suppose their extinction in the Apennines does not seem founded.

Therefore, according to our actual knowledge, they are not two indigenous Italian species, but only recently introduced (after 12.500 BP).

The differentiation between **maculicornis** and **simplonica**, close but sufficiently differentiated species and with superposed areals in the Alps, could have occurred even during the Würm.

In southwestern part of their Recent areal, both species are known until the French and Italian Maritimes Alps (Cuneo distr.), but while alpine records of **simplonica** decrease eastwards, records of **maculicornis** decrease westwards. This fact suggests that these species had been allopatric during the Würm and their expansion in the Alps began from opposite located refuges.

The expansion of **simplonica** had occurred northwards and later eastward from the refuges of Provence, disconnected from Italian ones. Then it penetrated in Italian Alps though Col de Tende probably (such as it occurred to **hybrida**) and therefore its Italian colonisation occurred not earlier than 9.500 BP. Instead, if such colonisation had occurred by following larch, it could be datable at about 8.000 BP (BRUGIAPAGLIA, 1997); nevertheless, such conifer is not in the Maritimes Alps and it does not seem closely related to this beetle. Moreover, systematic confusion between **simplonica** and **maculicornis** (the first species has been unfortunately reputed by some recent authors a simple variety of the second) does not let know the biology of this cerambycid and therefore clarify the question.

Same dates and limits of **hybrida** could be reputed reasonably correct for the expansion of **simplonica** in the Alps: in fact their alpine areals are similar.

Instead, the expansion of **maculicornis** could have begun from Eastern European refuges of birch and Scots pine, where birch could have been a secondary host. Such expansion has occurred westward and northward in Northern Europe and southward in the Alps.

About 18.000 BP Middle-European birch-Scots pine forests had been present only in the Carpathians (SOFFER, 1990). During this time, **maculicornis** had been probably only here and it had not widespread as today. Similar forests had been present also in Italian refuges until to Calabria (BERTOLANI & MARCHETTI, 1984); nevertheless, **maculicornis** had not been present here, otherwise it could be today also in the Apennines as relict species.

During the Sub-Arctic (10.500-8.250 BP) **maculicornis** had expanded widely following its hosts (FENAROLI & GIACOMINI, 1958; STRASBURGER,

1982). In this time it has occupied most of Middle Europe, it reached the Alps, Spain, and perhaps the British Isles (where birch arrived about 10.000 BP and Scots pine about 9.500 BP, according to BIRKS, 1989), where nevertheless is not present today. By the ice regression it reached Scandinavia, where Scots pine had been predominant in the Kola Peninsula (beyond its recent northern limits) between 6.680 and 3.830 BP (MACDONALD *et alii*, 2000). Later, trees of more temperate climates in several zones have supplanted such mixed-forests, while **maculicornis** remained limited in recent birch birch-Scots pine areal.

Local missing in the British Isles could have due to extinction. European spread velocity had been of 1,5 km/year for Scots pine and of 2 km/year for birch (BIRKS, 1989) and there are no reasons to repute it slower for **maculicornis**; therefore, it reached the Isles likely. Scots pine lost England since as the Atlantic (6.000 BP) regressing to Scotland, where it is today confined with another population survived in nunataks during the Würm (BIRKS, 1989). Such pinewoods could have been already missing of this beetle or the habitat of Scots highlands have been favourable for the pine, but not for the survival of the beetle. In fact, differently from **maculicornis**, the only cerambycids present here - **Acanthocinus aedilis** (L., 1758), **Rhagium inquistor** (L., 1758), **Leptura quadrifasciata** (L., 1758) and **Judolia sexmaculata** (L., 1758) - are widespread Euro-Siberian species, related to colder climates and able to reproduce (also) in zones missing of favourable flowers.

Wider spread of birch-Scots pine forests has permitted to **maculicornis** a European spread wider than other related species. Nevertheless, smaller spread of its hosts in Italian Alps (especially in the west) has not let the same diffusion in Italy too.

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