Fig. 1: Frequency distribution of discriminant values D(14) of worker nest samples to separate *Formica picea* NYLANDER, 1846 and *Formica candida* SMITH, 1879.

Neotype fixation for *Formica candida* SMITH, 1878

BOLTON (1995), following EMERY (1925) and DLUSSKY (1967), who both considered *Formica candida* SMITH as junior synonym of *F. picea* NYLANDER, automatically introduced *Formica candida* as oldest available name for *F. picea*. Both, Emery and Dlussky did not present a conclusive argument and their idea can also not be supported by the information stored in the original description or in collections.

Formica candida has been described based upon a single gyne that was found "... *On the road across the Pámir, from Sarikol to Panja ...*" (SMITH 1878). According to the curators of the collections in Oxford University Museum and British Museum of Natural History (Chris O'Toole and Barry Bolton, pers. comm., 2001), the whereabouts of this material are unknown. Inquiries sent to the National Zoological Survey of India Calcutta, another possible depository, where not answered. For the latter institution, it was not even possible to discover the name of a responsible curator for any of the probably existing insect collections. The description of Smith is insufficient even in terms of his time. It allows to exclude a blackish *Camponotus*, most probably to exclude a *Proformica* and to assume that *F. candida* should be a blackish *Formica* with a shining gaster in the gyne. The elevation of the locus typicus is between 2000 and 3500 m. The author has no material from the type locality (about 36°50'N, 73°20'E) in his collection but he has specimens from 315 km north (39°42'N, 73°27'E). Here, two blackish species with shining gasters in the gyne are sympatric and abundant between 2000 and 3000 m – a species most similar to *F. picea* and another one equal or near to *Formica lemani* BONDROIT, 1917. As a consequence, not even an assumption is possible to which of the two species *F. candida* should refer.

As solution of this dilemma and estimating a low risk of preservation of the original specimen, a neotype fixation for *Formica candida* SMITH, 1878 in a worker specimen is performed here:

The specimen is labelled "KYRGHYZTAN: Alai-Valley 39.42.09 N, 73.27.24 E, 3200 m, leg. R.Schultz 1999.07.21-67" and "Neotype *Formica candida* Smith 1878 det. Seifert". It is the bottom specimen of three workers on the same pin which were collected from the same nest and stored in SMN Görlitz. The neotype has the data CS 1.112 mm, CL / CW 1.132, SL / CS 1.032. The neotype locality is about 315 km N of the site given by Smith which is "very near" in terms of Asian dimensions. The mtDNA sequence data of the neotype sample No. 67 is stored under GenBank Accession No. AY786154 (Haplotype "Kyrgizstan-II"), those of samples No. 64 and No. 66 from the neotype locality under No. AY786153 (Haplotype "Kyrgizstan-I").

2. Evidence for heterospecificity of *F. picea* and *F. candida* and their distribution in the Palaearctic

The Palaearctic ants collected by BOLTON (1995) under the name *F. candida* can be subdivided into a minimum of two entities which are considered here as different species. According to examination of three mtDNA loci with 1500 base pairs (GOROPASHNAYA 2003), the *F. candida* complex shows a rather strong phylogeographic structure and can be subdivided in two main clades – a European-West Siberian clade and a clade occurring in the Central Asian Mountains. The two main clades showed a net sequence divergence of 1.2 % which is much in terms of the genus *Formica* in which clearly different species such as *F. pratensis* and *F. lugubris* or *F. truncorum* and *F. frontalis* differ by only 0.85 to 1.2 % (GOROPASHNAYA & al. 2004a, b).

This genetic separation could be confirmed on the morphological level by a discriminant analysis using absolute cephalic size and 13 size-corrected characters of 67 nest samples where a minimum of two workers per sample was available. The discriminant D(14) with

$D(14) = 42.98 - 2.65 \text{ CS} - 44.11 \text{ CL} / \text{CW}_{1.4} + 0.58 \text{ SL/CS}_{1.4} - 8.88 \text{ PEW} / \text{CS}_{1.4} + 4.18 \text{ GHL} / \text{CS}_{1.4} + 0.12 \text{ nOCC}_{1.4} + 0.79 \text{ nGU}_{1.4} + 0.48 \text{ nPN}_{1.4} - 0.54 \text{ nMN}_{1.4} + 0.29 \text{ nPR}_{1.4} - 1.25 \text{ nPE}_{1.4} - 0.25 \text{ nHFFL}_{1.4} + 0.72 \text{ RipD}_{1.4} + 0.67 \text{ sqPDG}_{1.4}$

provided a reasonable separation of the Palaearctic samples into two groups which are interpreted here as *Formica picea* and *Formica candida*.

F. picea: D(14) -2.049 ± 0.894 [-0.49,-3.58] n = 24
F. candida: D(14) 2.054 ± 1.053 [0.49, 4.81] n = 43

94 % of 67 determinations had error probabilities < 0.05. This clear result indicates that the grouping is basically real which, however, does not exclude that the *F. candida* cluster could be subdivided further. There are suggestions on heterogeneity of the *F. candida* cluster, meaning that one of Ruzsky's, Forel's or Stärcke's names could be revived some day for referring to a third species, but the data available do not allow to demonstrate this at the present stage. There