

is one sample from Tibet which seemed to show genetic proximity to the West Palaearctic clade (GOROPASHNAYA 2003). However, its position is only weakly supported by bootstrap values and more samples from this region are needed to find phylogenetic relationships of the *F. candida* from Tibet and from Western Europe.

A detailed consideration shows significant differences in primary data of individuals for 9 characters and in size-corrected nest sample means for 13 characters (Tab. 1). The best discriminators are RipD, sqPDG, and CL / CW.

Despite the apparently good discrimination of both species, the difficulties to measure RipD and sqPDG with the accuracy required here must be kept in mind. Accidental selection and insufficient number of measuring spots as well as surface pollution may affect the results and further errors would occur in sqPDG when damaged surface areas are included without considering the basal points and length of missing hairs. As a consequence, the separation of the two sister species needs a very careful consideration of the measuring schedule described in Methods.

According to the morphological and genetical identifications we have so far, *Formica picea* is distributed from Europe to the West Siberian lowland and is also found in the high Caucasus. The apparent absence from the Baikal region or North Mongolia needs to be confirmed. *Formica candida* is known so far only from the Central Asian mountain regions (Himalayas, Pamirs, Tien Shan, Tarbagatai, Saur east to the Altai region), the Baikal region, Mongolia, Tibet and East Siberia. The present information does not allow to state if there is some geographic overlap of the sister species or a clear parapatry. The idea that both species are separated in the east-west direction by the Johansen Line (a division of East and West Palaearctic faunas due to postglacial ecological reasons) and in the north-south direction by the western section of the Reinig Line (a division of faunas for glacial ecological reasons, DE LATTIN 1967) is suggested by the known data but the big capacity of both species to survive cold continental winters should make these borders penetrable.

If a third species should be identified some day within the *F. candida* cluster, the following six taxa with type localities more than 2000 km outside the geographic range of *F. picea* and deeply within the range of *F. candida* should be checked. These are *F. fusca* ssp. *gagates* var. *filchneri* FOREL, 1907 [unavailable name] from Lanshou in East Tibet, *F. picea* var. *lochmatteri* STÄRCKE, 1935 from the West Himalayas and four taxa of Ruzsky, all collected during the Kozlov expedition in northeastern Tibet in 1901: *F. fusca* subsp. *orientalis* RUZSKY, 1915, *F. picea* var. *inplana* EMERY, 1925 [first available use of *F. fusca picea* var. *inplana* RUZSKY, 1915], *F. fusca* var. *piceoimplana* EMERY, 1925 [first avail-

able use of *F. fusca picea* var. *piceo-inplana* RUZSKY, 1915] and *Formica fusca* ssp. *orientalis* var. *piceo-orientalis* RUZSKY, 1915 [unavailable name].

### 3. Redescription of *Formica candida* SMITH, 1878

Material investigated: Altogether 44 samples with 117 specimens from the following sites were morphometrically investigated:

Bhutan: Dorjee-Khandu, IX.1975, 3600 m; Paro 19.V.1972, 2300 m. China: Tibet: Oring Nor (35.00 N, 97.29 E), 4285 m, 30.VI.1990; Tibet: Madoi (35.01 N, 96.23 E), 4700 m, 22.VI.1990; Tibet: Heka (35.47 N, 99.52 E), 4000 m, 14.VII.1990; Tibet: Gonghe (36.16 N, 100.37 E), 3500 m, 8.V.1992; Tibet: Gonghe (36.20 N, 100.40 E), 3500 m, 21.VI.1998; Tibet: Xining (36.34 N, 101.53 E), 18.VII.1990; Tibet: Heimahe (36.44N, 99.35E), 24.V.1990; Tibet: Koko Nur, Niao Dao (36.48 N, 99.53 E), 29.V.1990; Tibet: Koko Nur, Nia Dao (36.45 N, 99.47 E), 25.VI.1998; Tibet: Chaka (36.49 N, 99.16 E), 16.VI.1990; Tibet: Chaka (36.45 N, 99.12 E), 3400 m, 29.VI.1998; Tibet: Beishan Nat. Park (36.56 N, 102.29 E), 25.V.1996 (No 911, No 912). India: Kashmir: Dras-Zoijla, 3200 m, 18.VII.1976. Kazakhstan: Saur Mts. (47.18 N, 85.37 E), 1486 m, 24.VII.2001 (No 237, No 324); Manrak Mts. (47.19 N, 84.37 E), 1168 m, 27.VII.2001 (No 270, No 345). Kirgisia: Tien Shan: Alai valley (39.42 N, 73.27 E), 3200 m, 21.VII.1999 (No 64, 66, 67); Tien Shan: Otuk valley (41.48 N, 75.45 E), 2600 m, 16.VII.1999 (No 16, No 17); Tien Shan: Dolon pass (41.50 N, 75.45 E), 3000 m, 16.VII.1999 (No 11); Tien Shan: Enyltshak valley (42.04 N, 79.12 E), 2700 m, 25.VII.2000 (No 260, No 267); Tien Shan: Sousamyr valley (42.12 N, 73.20 E), 2500 m, 18.VII.1998; Tien Shan: Kirgisky Alatau (42.25 N, 73.45 E), 3000 m, 17.VII.1998. Mongolia: Charchorin (47.04 N, 102.37 E), 2.X.1985; without locality name (47.04 N, 113.35 E), 11.VIII.1999; without locality name (47.16 N, 107.38 E), 18.VII.1997; without locality name (47.17 N, 107.38 E), 22.VIII.1999; without locality name (47.54 N, 106.25 E), 1405 m, 30.VII.2003; Dormod-Aimag, 16.VIII.1997. Russia: Baikal region (106.23 E, 53.47 N), 22.VIII.2001; Baikal region (106.31 E, 53.02 N), 22.VIII.2001; Baikal region (106.54 E, 53.01 N), 22.VIII.2001; Baikal region, (107.29 E, 53.15 N), 24.VIII.2001; Barnaul (53.17 N, 83.46 E), 19.VII.2000; Yakutia: Nat. Park Lensky Stolby (66.40 N, 126.10 E), 1999; Ussuri region: (43.16 N, 134.08 E), 174 m, V.2001; Ussuri region (42.54 N, 133.51 E), 35 m, 1999.

Description of the worker: Mean size smaller than *Serviformica* average: CS 1.240 mm. Head and scape shorter than in the next related species, i.e. *F. picea*, *F. gagatoides* and *F. kozlovi*: CL / CW<sub>1.4</sub> 1.101, SL / CS<sub>1.4</sub> 1.010 (Tab. 2). Frontal triangle as shining as the adjacent surfaces. Cuticular surface of head, mesosoma and gaster, as result of strongly reduced pubes-