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Mirosława Dylewska & Jan Noskiewicz

Apoidea of the Pieniny National Park. Part II. *Colletidae, Andrenidae, Halictidae, Melittidae, Apidae (Nomada* Scop.*)*

Apoidea* Pienińskiego Parku Narodowego. Część II. *Colletidae, Andrenidae, Halictidae, Melittidae, Apidae (Nomada* Scop.*)

Apoidea* Пенинского Парка. Част II.*Colletidae, Andrenidae, Halictidae, Melittidae, Apidae (Nomada* Scop.*)

INTRODUCTION

Part of the results from the study of the Apoidea collected in the Pieniny National Park during the years 1957—1961 was published in a paper entitled: „The *Apoidea* of the Pieniny National Park. Part I. *Megachilidae* and *Apidae* (partim)“, by M. Dylewska, in 1962. The present paper comprises the remaining families of the *Apoidea*, namely, *Colletidae*, *Andrenidae*, *Halictidae*, *Melittidae*, and the genus *Nomada* Scop. of the family *Apidae*. A collaboration by both of the present authors enabled them to cover extensive material containing about 3500 specimens, as well as to provide the present paper with abundant data made by J. Noskiewicz from various localities in Poland, that enriched the zoogeographic analysis of the considered families on the background of the fauna of those in Poland.

In order to facilitate the presentation of the pattern of the distribution of the considered species in Poland, we divide Poland into six regions (similar division is given in the Part I of this study), namely:

I. Pieniny Mts.
II. Tatra Mts.
III. Carpathians Ranges other than Pieniny Mts. and Tatra Mts.

IV. Silesia and Sudeten Mts.

V. Central Poland (from the foot hills of the Tatra Mts. to Bydgoszcz latitude except for the Białowieża Virgin Forest).

VI. Northern Poland (Pomerania, Pomeranian Lake District and Białowieża Virgin Forest).

Of the herein considered families of the *Apoidea* four species have been previously recorded from the Pieniny Mts. These are: *Andrena agilissima* (SCOP.) (SITOWSKI & KUNTZE, 1910), *Andrena haemorrhoa* (FABR.), *Halictus minutus* (K.) and *Halictus malachurus* (K.) (WIERZEJSKI, 1868). However, the occurrence of the last two species should be confirmed, as the specimens of these species are missing from the WIERZEJSKI collection, moreover, the present authors have found some inaccurate determinations made by WIERZEJSKI. The *Apoidea* of the Tatra Mts. was worked out by J. NOSKIEWICZ (1920), moreover, in the papers of WIERZEJSKI (1868, 1874) and of ŚNIEŻEK (1910) there are some data on the distribution of the group under consideration in the Tatra Mts. and in other ranges of the Carpathians. In the Subcarpathian Lowland the *Apoidea* were collected by NIESIOŁOWSKI (1948) and KRYSIŃSKI (1957), in the Kraków region by WIERZEJSKI (1868, 1874), ŚNIEŻEK (1910) and NOSKIEWICZ (1923). Moreover, some data on the *Apoidea* from Central Poland are contained in the papers of NOSKIEWICZ (1952) (Pieprzowe Mts. near Sandomierz and xerothermic region on the River Nida), DROGOSZEWSKI (1932, 1934) (Kielce region and Łowicz region), TORKA (1913, 1933) and SZULCZEWSKI (1948) (Great Poland), and of MINKIEWICZ (1935) (Kazimierz on the River Vistula). The *Apoidea* of the Sudeten Mts. and Silesia were worked out by DUCKE (1898, 1900), DITTRICH (1903), ALFKEN (1924), TORKA (1924), NOSKIEWICZ (1947, 1948, 1949), MACKO and NOSKIEWICZ (1954) and PAX (1921). The data on the *Apoidea* of Northern Poland are to be found in the papers of BLÜTHGEN (1919, 1942) (Pomerania), BRIESCHKE (1888, 1889), ALFKEN (1909, 1912, 1913), SPEISER (1906, 1908), MINKIEWICZ (1935), BAER (1903, 1904) and MOESCHLER (1938). The *Apoidea* of the North-Eastern Poland were studied by BISCHOFF (1925) and ADOLPH (1934). Moreover, in the zoogeographic analysis there are considered the zocgeographic elements and the origin of the *Apoidea* in the Pieniny Mts. (especially that of the xarothermophil species).

In the ecological characteristics of the individual families of the *Apoidea* there is made a comparison study of the fauna of those families of the southern slopes of the Pieniny Mts. (most xerothermic) with that of the northern slopes which are colder and more moist (compare Part I of this study pp. 424—426). The individual habitats are here numbered as in Part I of this study:

I — thick, moist woods of the northern slope,
II — park-type meadows of the northern slope,
III — thin, well insolated woods of the steep southern slope,
IV — glades of the Trzy Korony massif,
V — meadows of the southern slope,
VI — screes and rocks of the southern slope,

VII — fields and meadows at the foot of the southern slope,
VIII — belt of the river osiers on the River Dunajec and Krośnica.

The ecological characteristics contain the data on the time of appearance of the individual species.

The localities in which the respective species were found are given after the above habitats I—VIII.

I. LIST OF SPECIES

Family: *Colletidae*

Genus: *Prosopis* Jur.

1. ***P. confusa*** (Nyl.)
   III. Gojny Las 6. VIII. 1959, ♀ on *Leonthodon* L.
   IV. Trzy Korony 20. VII. 1959, ♀ (leg. K. Malski) — Ligarki 12. VI. 1960, ♀ (leg. K. Malski) — Kosarzyska 18. VII. 1960, ♂ — Wyżni Łazek 27. VI. 1961, ♂.
   V. In a glade in Gojny Las 6. VIII. 1959, ♀ on *Leonthodon* L.
   VI. Grabczycha 12. VI. 1961, ♂; 20. VI. 1961, ♂; 21. VI. 1958, ♂ on *Rosa* L.; 27. VI. 1961, ♀ on *Leonthodon* L.; 11. VII. 1957, ♀ on *Campanula* L.; 23. VII. 1960, ♀; 5. VIII. 1960, ♂ on *Campanula* L.; 10. VIII. 1959, ♀♀; 11. VIII. 1960, ♀ on *Campanula* L.; 24. VIII. 1959, ♀♀; 4. IX. 1959, ♀ — Ostra Skała 6. VII. 1957, ♀; 10. VII. 1957, ♀; 16. VII. 1957, ♀ on *Leonthodon* L.; 15. VIII. 1960, ♀; 27. VIII. 1959, ♀ — Podskalnia Góra 1. VII. 1961, ♀; 5. VII. 1957, ♂ on *Campanula* L. — Pieniński Potok Valley 6. VI. 1961, ♂.
2. ***P. brevicornis*** (Nyl.)
   VI. Grabczycha 21. VI. 1958, ♂; 27. VI, 1961, ♂♂ on *Sedum* L.; 10. VIII. 1959, ♂♀ — Nowa Góra 28. VIII. 1957, ♀.
3. ***P. sinuata*** Schenck
   VI. Grabczycha 27. VI. 1961, ♂ on *Sedum* L.; 10. VIII. 1959, ♀.
4. ***P. communis*** (Nyl.)
   V. Nanowe 8. VIII. 1960, ♀ — Nowa Góra 11. VII. 1957, ♂.
   VI. Grabczycha 15. VI. 1961, ♂; 27. VI. 1961, ♂ on *Sedum* L.; 10. VII. 1957, ♀; 15. VII. 1958, ♀; 18. VIII. 1959, ♀ — Ostra Skała 6. VII. 1957, ♂ on *Sedum* L.
   VII. Sromowce Niżne 6. VII. 1957, ♀.
5. ***P. nigrita*** (Fabr.)
   V. Nowa Góra 12. VIII. 1959, ♀.
   VI. Grabczycha 6. VII. 1961, ♂ on *Anthemis tinctoria* L.; 23. VIII. 1960, ♂♀♀ on *Anthemis tinctoria* L.; 6. VIII. 1959, ♂♂♀♀ on *Anthemis tinctoria* L.
6. ***P. difformis*** Ev.
   III. Gojny Las 6. VII. 1957, ♂.
   IV. Ligarki 10. VIII. 1960, ♀.
   V. Szopka Pass 28. VIII. 1957, ♀ — Nowa Góra 27. III. 1959, ♀ (leg. K. Malski).
   VII. Sromowce Niżne 19. VII. 1961, ♂.
   VIII. Wielka Polana 10. VII. 1957, ♂ — Sromowce Niżne 20. VI. 1958, ♂.
7. ***P. hyalinata*** (Sm.)
   II. Ociemne Valley 20. VII. 1960, ♂.
   V. Nanowe 8. VIII. 1959, ♀; 10. VI. 1961, ♂ — Nowa Góra 26. VI. 1961, ♂♂ — In a glade in Gojny Las 27. VIII. 1959, ♀ on *Leonthodon* L.

VI. Grabczycha 21. VI. 1958, ♂♀; 27. VI. 1961, ♂♂♀♀ on *Sedum* L.; 24. VII. 1959, ♂; 5. VIII. 1960, ♀♀ on *Anthemis tinctoria* L.; 10. VIII. 1959, ♀; 11. VIII. 1960, ♂ on *Leonthodon* L.; 14. VIII. 1957, ♀; 23. VIII. 1960, ♀; 27. VIII. 1957, ♀ (leg. K. Malski) — Ostra Skała 6. VII. 1957, ♂♂ on *Sedum* L.; 15. VIII. 1960, ♀; 27. VIII. 1957, ♀ (leg. K. Malski) — Goła Góra 9. VI. 1961, ♂♂♀; 14. VII. 1961, ♂♂♀♀ on *Sedum* L.; 11. VIII. 1959, ♀ — Zamczysko 21. VI. 1961, ♂♀♀; 11. VII. 1961, ♀♀.

Family: *Andrenidae*

Genus: *Andrena* Fabr.

1. ***A. agilissima*** (Scop.)

IV. In a meadow at the foot of Klejowa Góra 16. VI. 1960, ♂ on *Taraxacum officinale* L. — Wyżni Łazek 21. V. 1958, ♀ on *Miosotis* L.

VI. Goła Góra 20. V. 1958, ♂♂♀♀ on *Erysimum* L.; 22. V. 1958, ♂♂ — Grabczycha 15. VI. 1958, ♀ on *Erysimum* L.; 19. V. 1958, ♂ on *Erysimum* L.

VII. Sromowce Niżne 17. V. 1958, ♂♂♀♀ at nests; 18. V. 1958, ♂; 19. V. 1958, ♂♂ on *Taraxacum officinale* L.; 23. V. 1958, ♀♀ on *Taraxacum officinale* L.; 28. V. 1958, ♂♂; 10. VI. 1961, ♀.

VIII. Krościenko 14. VI. 1962, ♀ on *Bellis* L.; 19. VI. 1962, ♀♀ at nests.

2. ***A. vaga*** Pz.

VI. Sobczański Glen 3. VII. 1957, ♀ on *Euphorbia* L.

3. ***A. thoracica*** (Fabr.)

IV. In a meadow at the foot of Klejowa Góra 4. V. 1960, ♀ on *Salix* L.

VI. Grabczycha 28. IV. 1960, ♀.

VIII. Sromowce Niżne 14. V. 1960, ♂ on *Salix* L.; Kąty 3. V. 1960, ♀♀ on *Salix* L.; Czorsztyn 14. VI. 1960, ♀♀ on *Salix* L. — Krościenko 14. IV. 1960, ♀.

4. ***A. pubescens baltica*** Alfken

II. Stolarzówka 16. IV. 1959, ♀ on *Salix* L. — Pieniński Potok Valley 4. V. 1960, ♀♀ on *Petasites officinalis* Moench and *Ribes grossularia* L.

IV. In a meadow at the foot of Klejowa Góra 4. V. 1960, ♂ on *Taraxacum officinale* L.; 16. V. 1960, ♀ on *Taraxacum officinale* L.; 8. VII. 1957, ♀ — Ligarki 28. V. 1958, ♀ on *Euphorbia* L.

V. Szopka Pass 18. V. 1958, ♀ on *Campanula* L. — Nowa Góra 16. IV. 1958, ♂ on *Salix* L.

VI. Zamkowa Góra 21. V. 1958, ♀; 12. V. 1960, ♀♀ on *Alyssum arduini* Fritsch. — Sobczański Glen 11. V. 1960, ♀ on *Taraxacum officinale* L.

VII. Magierowa Skałka 17. V. 1958, ♂ on *Taraxacum officinale* L.

VIII. Sromowce Niżne 10. V. 1960, ♀ on *Taraxacum officinale* L.; 14. V. 1960, ♀♀ on *Salix* L.; 19. V. 1958, ♀; 21. V. 1958, ♀; Kąty 17. IV. 1958, ♂♂ on *Salix* L.; 11. IV. 1960, ♂ on *Salix* L.

5. ***A. tibialis*** (K.)

V. Szopka Pass 10. V. 1960, ♀ on *Taraxacum officinale* L. — Góra Zamkowa ad Czorsztyn 17. IV. 1960, ♂♂ on *Salix caprea* L.

VI. Góra Zamkowa 12. V. 1960, ♀ on *Ribes alpinum* L. — Kotłowa Valley 15. V. 1958, ♀.

VIII. Kras 11. IV. 1960, ♂ on *Salix* L. — Gorge of the River Dunajec 4. V. 1960, ♂ on *Picea excelsa* Lk. twigs.

6. ***A. haemorrhoea*** (Fabr.)

Pieniny Mts., ♂♂ leg. Sitowski.

II. Stolarzówka 15. IV. 1959, ♂♂ on *Salix caprea* L.; 16. IV. 1959, ♂♂♀ on *Salix caprea* L.;

18. IV. 1959, ♂ on *Salix* L. — Hudziary 24. VII. 1957, ♀ — Wymiarki 10. V. 1960, ♂♂ on *Salix* L.; 12. V. 1960, ♂ on *Salix* L.; 20. V. 1960 on *Salix* L. — Ociemne Valley 22. IV. 1959, ♀ on *Taraxacum officinale* L.

IV. In a meadow at the foot of Klejowa Góra 4. V. 1960, ♂ on *Salix* L. — Kosarzyska 19. VI. 1960, ♂ (leg. K. Malski).

V. Szopka Pass 10. V. 1960, ♂♂♀ on *Taraxacum officinale* L.; 11. V. 1960, ♂ on *Taraxacum officinale* L.; 12. V. 1960, ♀ on *Taraxacum officinale* L. — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂♂♀ on *Salix caprea* L.; 19. IV. 1960, ♂ on *Salix caprea* L. — Pieniński Potok Valley 12. IV. 1960, ♂; 30. IV. 1961, ♂♂ on *Prunus spinosa* L.; 4. V. 1960, ♂♂ on *Petasites officinalis* L.; 9. V. 1960, ♂♂ on *Salix* L.

VI. Pieniński Potok Valley 15. IV. 1959, ♀ on *Salix* L.; 4. V. 1960, ♂♂ on *Ribes grossularia* L.

VII. Magierowa Skałka 17. V. 1958, ♀ on *Taraxacum officinale* L. — Sromowce Niżne 19. V. 1958, ♀ — Bańkowy Gronik 18. IV. 1959, ♂♂ on *Salix* L.

VIII. Sromowce Niżne 16. IV. 1960, ♀ on *Salix* L.; 14. V. 1960, ♂♂♀♀ on *Salix* L. and *Taraxacum officinale* L.; 17. V. 1958, ♀ on *Salix* L. — Kąty 3. V. 1960, ♂ on *Salix* L. — Czorsztyn 14. IV. 1960, ♂ on *Salix* L. — Krościenko 14. IV. 1960, ♂♂♀♀ on *Salix* L. — Kras 17. IV. 1959, ♂♂♀♀ on *Salix* L. — Wielka Polana 5. V. 1960, ♂♂♀ on *Taraxacum officinale* L.

7. ***A. nigroaenea*** K.

III. Gojny Las 15. VI. 1961, ♂ on *Juniperus* L.

VI. Podskalnia Góra 29. VI. 1961, ♂ — Pieniński Potok Valley 16. VI. 1961, ♂.

VII. Sromowce Niżne 8. VI. 1960, ♂ on *Rezeda* L.; 20. VI. 1961, ♂ on *Rezeda* L.; 26. VI. 1961, ♀.

8. ***A. fulvago*** (Christ)

II. Ociemne Valley 20. VII. 1960, ♂.

IV. In a meadow at the foot of Klejowa Góra 16. V. 1960, ♂ on *Taraxacum officinale* L. — Wyżni Łazek 28. V. 1958, ♂ — Kosarzyska 16. VII. 1958, ♂.

V. Pieniński Potok Valley 20. V. 1960, ♂♀♀ on *Taraxacum officinale* L.; 15. VI. 1961, ♂♂ — Trzy Korony 16. VI. 1958, ♀.

9. ***A. humilis*** Imhoff

V. In a glade in Gojny Las 20. VI. 1961, ♀♀ — Trzy Korony 16. VI. 1958, ♀ — Sobczański Glen 17. V. 1960, ♀♀ on *Taraxacum officinale* L. — Nanowe 19. VI. 1961, ♂ on *Picea excelsa* Lk. twigs — Szopka Pass 15. VI. 1961, ♀♀ — Pieniński Potok Valley 15. VI. 1961, ♀♀.

VIII. Sromowce Niżne 6. V. 1960, ♂ on *Taraxacum officinale* L.; 17. V. 1958, ♀; 19. V. 1958, ♂♀♀; 20. VI. 1958, ♀♀ — Wielka Polana 5. V. 1960, ♂ on *Taraxacum officinale* L.; 16. V. 1958, ♀ — Kąty 13. V. 1960, ♂.

10. ***A. taraxaci*** Gir.

II. Stolarzówka 30. IV. 1961, ♀♀ on *Taraxacum officinale* L. — Toporzysko 16. IV. 1959, ♂♂♀ on *Tussilago farfara* L. — Gojny Las 6. V. 1960, ♀ on *Taraxacum officinale* L.

V. Szopka Pass 10. V. 1960, ♀♀ on *Taraxacum officinale* L. — Sobczański Glen 9. V. 1960, ♀ on *Taraxacum officinale* L.; 10. V. 1960, ♀ on *Taraxacum officinale* L.; 17. V. 1960, ♀♀ on *Taraxacum officinale* L.

VII. Magierowa Skałka 17. V. 1958, ♀ on *Taraxacum officinale* L.

VIII. Sromowce Niżne 10. V. 1960, ♀♀ on *Taraxacum officinale* L.; 17. V. 1958, ♀♀ on *Taraxacum officinale* L.; 19. V. 1958, ♀ on *Taraxacum officinale* L. — Wielka Polana 16. V. 1958, ♀ — Czorsztyn 13. IV. 1960, ♂♂ on *Tussilago farfara* L. — Krościenko 14. IV. 1960, ♀ on *Salix* L.

11. ***A. bicolor*** Fabr.

II. Ociemne Valley 20. VII. 1960, ♀ — Hudziary 24. V. 1957, ♀ — Stolarzówka 15. IV. 1959, ♀ on *Salix caprea* L. — Wymiarki 10. V. 1960, ♀♀ on *Salix* L.; 10. VII. 1961,

♂ — Domiarki 9. V. 1960, ♀♀ on *Primula elatior* L. — In meadows on Trzy Korony 5. VII. 1961, ♀ on *Campanula* L.

IV. Kosarzyska 21. V. 1957, ♀; 11. V. 1960, ♀ on *Salix* L. — In a meadow at the foot of Klejowa Góra 4. V. 1960, ♂♀ — Ligarki 11. V. 1960, ♀.

V. Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂♀♀ on *Salix caprea* L. and *Primula elatior* L. — Nowa Góra 15. V. 1958, ♀; 11. VII. 1957, ♀ — Szopka Pass 9. V. 1960, ♀ on *Taraxacum officinale* L.; 12. V. 1960, ♀♀ on *Taraxacum officinale* L. — Pieniński Potok Valley 30. IV. 1961, ♀ on *Taraxacum officinale* L.; 12. IV. 1960, ♀; 20. V. 1960, ♀♀ on *Taraxacum officinale* L. and *Cardamine* L.; 4. V. 1960, ♀ on *Petasites officinalis* Moench. — Sobczański Glen 10. V. 1960, ♀ on *Taraxacum officinale* L.; 17. V. 1960, ♀ on *Taraxacum officinale* L.; 17. V. 1960, ♀ on *Taraxacum officinale* L.; 7. VII. 1957, ♀ — In a glade in Gojny Las 6. V. 1960, ♀♀ on *Taraxacum officinale* L.; 20. VI. 1961, ♀; 25. VI. 1958, ♂; 5. VII. 1961, ♂; 6. VII. 1957, ♀; 6. VII. 1961, ♀ on *Campanula* L.; 8. VII. 1957, ♀; 15. VII. 1960, ♀; 11. VIII. 1960, ♀ — Nanowe 8. VIII. 1960, ♀.

VI. Góra Zamkowa 12. V. 1960, ♀♀ on *Salix* L. and *Alyssum arduini* Fritsch. — Ostra Skała 27. VI. 1961, ♀; 16. VII. 1957, ♀ on *Geranium* L.; 6. VII. 1957, ♀ — Grabczycha 21. IV. 1960, ♂; 25. IV. 1960, ♀; 20. VI. 1961, ♂; 27. VI. 1961, ♀ on *Geranium* L.; 11. VIII. 1960, ♀ on *Campanula* L.; 16. VIII. 1960, ♀♀ on *Campanula* L.; 24. VIII. 1959, ♀; 10. VIII. 1960, ♀ (leg. K. Malski) — Podskalnia Góra 17. V. 1960, ♀; 21. VII. 1961, ♂; 12. VII. 1961, ♀ on *Campanula* L. — Goła Góra 18. V. 1961, ♀ — Zamczysko 11. VII. 1961, ♀ — Pieniński Potok Valley 16. VI. 1961, ♀ on *Campanula* L.

VIII. Sromowce Niżne 6. V. 1960, ♀ on *Taraxacum officinale* L.; 14. V. 1960, ♀♀ on *Salix* L.; 19. V. 1958, ♀; 20. V. 1958, ♀ — Wielka Polana 5. V. 1960, ♀♀ on *Taraxacum officinale* L. — Sromowce Średnie 10. V. 1960, ♀ on *Taraxacum officinale* L.; 14. V. 1960, ♀♀ on *Salix* L. — Czorsztyn 13. IV. 1960, ♂ on *Tussilago farfara* L.; 14. IV. 1960, ♀♀ on *Salix* L. — Niedzica 14. IV. 1960, ♀ — Krościenko 14. IV. 1960, ♀♀ on *Salix* L.

12. ***A. helvola*** (L.)

VIII. Kąty 3. V. 1960, ♂♂ on *Salix* L.

13. ***A. praecox*** (Scop.)

II. Stolarzówka 12. IV. 1960, ♂♂ on *Salix caprea* L.; 15. IV. 1959, ♀ on *Salix caprea* L.; 16. IV. 1959, ♀♀ on *Salix* L.; 18. IV. 1959, ♀♀ on *Salix* L. — Wymiarki 10. V. 1960, ♀♀ on *Salix* L.; 18. V. 1960, ♀ on *Salix* L.

III. Nowisko 20. V. 1958, ♀.

IV. In a meadow at the foot of Klejowa Góra 4. V. 1960, ♀♀ on *Miosotis* L.

V. Pieniński Potok Valley 15. IV. 1959, ♀♀ on *Salix* L.; 19. IV. 1959, ♀♀ on *Salix* L.; 20. V. 1960, ♀ — In a glade in Gojny Las 28. IV. 1960, ♀ on *Bellis* L. — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂♂♀♀ on *Salix caprea* L.; 12. V. 1960, ♂ on *Salix* L. — Nowa Góra 16. IV. 1959, ♀♀ on *Salix* L.

VI. Góra Zamkowa 12. V. 1960, ♀♀ on *Salix* L. — Kotłowa Valley 15. V. 1958, ♀ — Czerwone Skałki 3. V. 1960, ♀ on *Salix* L.

VII. Podnowe 15. V. 1958, ♀♀ on *Leonthodon* L.

VIII. Sromowce Niżne 20. V. 1958, ♀; 14. V. 1960, ♀♀ on *Salix* L. — Wielka Polana 5. V. 1960, ♀ on *Taraxacum officinale* L. — Sromowce Średnie 14. IV. 1960, ♀♀ on *Salix* L. — Kąty 3. V. 1960, ♀♀ on *Salix* L. — Czorsztyn 14. IV. 1960, ♀♀ on *Salix* L. — Krościenko 14. IV. 1960, ♀♀ on *Salix* L. — Kras 11. IV. 1960, ♂♂♀ on *Salix* L.; 14. IV. 1959, ♀ on *Salix* L.; 17. IV. 1959, ♂♀♀ on *Salix* L.

14. ***A. fucata*** Sm.

III. Gojny Las 28. V. 1958, ♀. — Nowa Góra 26. VI. 1961, ♀.

IV. In a meadow at the foot of Klejowa Góra 30. VI. 1961, ♀. — Kosarzyska 18. VII. 1960, ♀. — Trzy Korony 19. VI. 1961, ♀ on *Rubus* L. — Wyżni Łazek 22. VI. 1961, ♀.

V. Pieniński Potok Valley 15. VI. 1961, ♀♀.
VI. Goła Góra 12. V. 1960, ♀. — Sobczański Glen 15. VI. 1961, ♂♂.
VIII. Sromowce Niżne 14. V. 1960, ♀ on *Salix* L.; 1. VII. 1961, ♀ on *Potentilla* L.

15. ***A. clarkella*** (K.)
II. Stolarzówka 16. IV. 1959, ♀ on *Salix* L.; 18. IV. 1959, ♀ on *Salix* L. — Wymiarki 10. V. 1960, ♀♀ on *Salix* L.
III. Góra Zamkowa 11. & 12. V. 1960, ♀♀ on *Salix* L.
V. Nowa Góra 16. IV. 1959, ♀♀ on *Salix* L.
VIII. Sromowce Niżne 14. V. 1950, ♀♀ on *Salix* L.

16. ***A. nycthemera*** Imhoff
V. Nowa Góra 16. IV. 1959, ♀♀ on *Salix* L.
VI. Grabczycha 19. V. 1958, ♀ — Wąwóz Sobczański 26. V. 1958, ♂ on *Stellaria holostea* L. — Góra Zamkowa 12. V. 1960, ♀♀ on *Salix* L. and *Ribes* L.
VII. Kras 17. IV. 1959, ♀ on *Salix* L.

17. ***A. nana*** (K.)
IV. Kosarzyska 18. VII. 1960, ♀.
V. Nowa Góra 12. VIII. 1959, ♂.

18. ***A. floricola*** Ev.
V. Rabsztyn 13. VIII. 1959, ♀.
VIII. Sromowce Niżne 10. V. 1960, ♀ on *Taraxacum officinale* L.

19. ***A. alfkenella*** Perk.
III. Kopa Siana 18. V. 1958, ♀.
IV. In a meadow at the foot of Klejowa Góra 16. VI. 1961, ♂ — Ligarki 12. VI. 1960, ♂ (leg. K. Malski).
V. Szopka Pass 18. V. 1958, ♀ on *Campanula* L. — Trzy Korony 16. VI. 1958, ♂♂ — Nanowe 10. V. 1961, ♂.
VI. Sobczański Glen 17. V. 1960, ♀ on *Taraxacum officinale* L.; 3. VII. 1957, ♂ — Podskalnia Góra 16. & 17. VI. 1960, ♀♀ — Goła Góra 9. V. 1961, ♀; 18. V. 1960, ♂♀♀; 23. V. 1958, ♂♀♀; 9. VI. 1961, ♀ — Czerwone Skałki 3. V. 1960, ♀ on *Taraxacum officinale* L. — Zamczysko 13. V. 1960, ♀♀ on *Fragaria* L.
VII. Podskale 12. VII. 1961, ♂.
VIII. Wielka Polana 5. V. 1960, ♂ on *Taraxacum officinale* L. — Czorsztyn 13. IV. 1960, ♂ on *Tussilago farfara* L. — Krościenko 14. IV. 1960, ♀ on *Salix* L.

20. ***A. subopaca*** Nyl.
V. Pieniński Potok Valley 20. V. 1960, ♀ on *Cardamine* L.; 11. VI. 1960, ♀ (leg. K. Malski) — Szopka Pass 10. V. 1960, ♀♀ on *Toraxacum officinale* L. — In a glade in Gojny Las 6. V. 1960, ♀ on *Taraxacum officinale* L.
VI. Ostra Skała 20. V. 1959, ♀ — Podskalnia Góra 17. V. 1960, ♀♀; 8. VI. 1961, ♂ — Goła Góra 18. V. 1960, ♀♀ — Zamczysko 13. V. 1958, ♀♀ on *Fragaria* L.
VIII. Sromowce Niżne 10. V. 1960, ♀ on *Taraxacum officinale* L.; 14. V. 1960, ♀♀ on *Salix* L.; 23. V. 1958, ♀ on *Taraxacum* L.

21. ***A. minutula*** (K.)
V. Trzy Korony 16. VI. 1958, ♀; 6. VII. 1957, ♂ — Szopka Pass 10. V. 1960, ♀ on *Taraxacum officinale* L.; 18. V. 1958, ♀ — Nanowe 8. VIII. 1960, ♀ — Nowa Góra 16. IV. 1959, ♀♀ on *Salix* L. — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♀ on *Salix caprea* L. — Cyrhla 5. V. 1960, ♀.
VI. Podskalnia Góra 17. V. 1960, ♂♀ — Goła Góra 3. V. 1960, ♀; 22. V. 1958, ♀ — Zamczysko 13. V. 1960, ♀♀ on *Fragaria* L.
VIII. Gorge of the Dunajec River 4. V. 1960, ♀ on *Taraxacum officinale* L. — Wielka Polana 5. V. 1960, ♀ on *Taraxacum officinale* L. — Sromowce Niżne 10. V. 1960, ♀ on *Taraxacum officinale* L.; 14. V. 1960, ♀♀ on *Salix* L.; 17. V. 1958, ♂♂♀ — Kąty 3. V. 1960, ♀ on *Fragaria* L.

22. *A. minutuloides* PERK.

III. Kopa Siana 18. V. 1958, ♀.

V. Pieniński Potok Valley 20. V. 1960, ♀♀ on *Cardamine* L. — Szopka Pass 10. V. 1960, ♀ on *Taraxacum officinale* L. — Trzy Korony 16. VI. 1958, ♀♀ — In a glade of Gojny Las 6. VIII. 1959, ♀ — Nanowe 18. V. 1958, ♂♀ on *Compositeae.*

VI. Grabczycha 20. VI. 1961, ♀; 26. VIII. 1957, ♀ (leg. K. MALSKI) — Podskalnia Góra 17. V. 1960, ♀; 1. VII. 1961, ♀ — Goła Góra 18. V. 1960, ♀; 9. VI. 1961, ♀; 28. VIII. 1959, ♀ — Zamczysko 13. VIII. 1959, ♀♀ on *Fragaria* L. and ♂♂ on *Thymus* L. and *Mentha* L. — Ostra Skała 27. VIII. 1957, ♀ (leg. K. MALSKI).

VIII. Sromowce Niżne 14. V. 1960, ♀ on *Salix* L. — Krościenko 14. IV. 1960, ♀ on *Salix* L.

23. *A. labiata* F.

V. Pieniński Potok Valley 20. V. 1960, ♀♀ on *Veronica chamaedris* L. and on *Cardamine* L. — Rabsztyn 12. VIII. 1959, ♂.

VI. Zamczysko 13. V. 1960, ♀ on *Fragaria* L.; 11. VII. 1961, ♂.

24. *A. marginata* FABR.

V. Nanowe 12. VII. 1959, ♀ on *Knautia kitaibelii* BORB. — Czoło 11. VII. 1957, ♂ on *Knautia* L.

VI. Grabczycha 10. VIII. 1959, ♀ on *Scabiosa* L. — Goła Góra 11. VIII. 1959, ♀.

25. *A. ventralis* IMHOFF

V. Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂♂ on *Salix caprea* L.

VIII. Gorge of the Dunajec River 4. V. 1960, ♂♂♀ on *Petasites officinalis* MOENCH and flying over the sand by the Dunajec River — Sromowce Niżne 14. V. 1960, ♂♂♀♀ on *Salix* L. — Czorsztyn 14. IV. 1960, ♂ on *Salix* L. — Krościenko 14. IV. 1960, ♂♂ on *Salix* L. — Kras 11. IV. 1960, ♂; 17. IV. 1959, ♂♂♀♀ on *Salix* L.; 14. IV. 1960, ♂ on *Salix* L.

26. *A. hattorfiana* (FABR.)

Pieniny Mts., ♂ (leg. SITOWSKI).

V. Pieniński Potok Valley 10. VII. 1961, ♀♀ on *Scabiosa* L. — Szopka Pass 19. VI. 1961, ♀ on *Knautia* L.; 9. VII. 1957, ♀ on *Knautia* L., ♀; 11. VII. 1957, ♀ on *Knautia* L. — Trzy Korony 12. VI. 1961, ♂ on *Scabiosa* L. — In a glade in Gojny Las 15. VI. 1961, ♂ — Nanowe 8. VIII. 1960, ♀.

VI. Grabczycha 12. VI. 1961, ♀ on *Scabiosa* L.; 13. VI. 1961, ♂ on *Scabiosa* L.; 20. VI. 1961, ♂ on *Scabiosa* L.; 22. VI. 1958, ♂ — Ostra Skała 5. VII. 1957, ♀ on *Scabiosa* L.; 15. VI. 1958, ♂ on *Scabiosa* L.; 21. VI. 1958, ♂♀♀ on *Scabiosa* L.

VII. Podskale 29. VI. 1961, ♀ on *Knautia* L.

VIII. Gorge of the Dunajec River 16. VI. 1961, ♀.

27. *A. jacobi* PERK.

II. Stolarzówka 30. IV. 1961, ♀ on *Prunus spinosa* L.; 16. IV. 1959, ♂ on *Salix caprea* L.

V. Szopka Pass 21. V. 1958, ♀ — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂ on *Salix caprea* L.

VIII. Kąty 3. V. 1960, ♂♂ on *Salix* L. — Kras 17. IV. 1959, ♂ on *Salix* L.

28. *A. curvungula* THOMS.

VI. Ostra Skała 25. VI. 1958, ♀.

29. *A. paucisquama* NOSK.

VII. Sromowce Niżne 15. VI. 1958, ♀ on *Campanula sibirica* L.

30. *A. labialis* (K.)

VI. Ostra Skała 15. VI. 1958, ♂.

31. *A. denticulata* (K.)

V. Trzy Korony 22. VII. 1959, ♀ — In a glade in Gojny Las 6. VII. 1961, ♀; 21. VIII. 1959, ♀.

VI. Ostra Skała 16. VII. 1957, ♂.

VIII. Wielka Polana 5. VIII. 1960, ♀.

32. ***A. coitana*** (K.)

Pieniny Mts., ♀ (leg. SITOWSKI).

II. Goła Góra 7. VIII. 1959, ♀.

III. Gojny Las 5. VII. 1961, ♀; 11. VIII. 1959, ♀.

V. Trzy Korony 15. VIII. 1958, ♀ — Nanowe 8. VIII. 1960, ♀♀.

VI. Grabczycha 5. VIII. 1960, ♀♀ — Kotłowa Valley 8. VIII. 1960, ♀.

33. ***A. barbilabris*** (K.)

VI. Grabczycha 13. VI. 1961, ♀ on *Viburnum* L.; 15. VIII. 1960, ♀ — Sobczański Glen 26. V. 1958, ♂♂ on *Stellaria holostea* L.

VIII. Gorge of the Dunajec River 16. V. 1960, ♂ on *Myosotis* L. — Sromowce Niżne 21. V. 1960, ♂♂ on a village street; 23. V. 1958, ♂ on *Taraxacum officinale* L.; 29. VI. 1961, ♀ — Wielka Polana 20. V. 1958, ♂ on *Taraxacum officinale* L.; 20. V. 1960, ♂ on *Taraxacum officinale* L.; 21. V. 1960, ♂♂ on *Taraxacum officinale* L.

34. ***A. proxima*** (K.)

V. Trzy Korony 16. VI. 1958, ♂♂.

VI. Goła Góra 18. V. 1960, ♂♂.

VIII. Gorge of the Dunajec River 16. V. 1960, ♂ on *Myosotis* L.

35. ***A. propinqua*** SCHENCK

V. In a glade in Gojny Las 21. VI. 1956, ♀ — Szopka Pass 18. V. 1958, ♀ on *Campanula* L. — Nanowe 6. VIII. 1960, ♀ — Pieniński Potok Valley 15. IV. 1959, ♀ on *Salix* L.

VI. Ostra Skała 17. VII. 1957, ♀.

VIII. Sromowce Niżne 14. V. 1960, ♀♀ on *Salix* L. — Czorsztyn 13. IV. 1960, ♂ on *Tussilago farfara* L.

36. ***A. dorsata*** (K.)

IV. Kosarzyska 13. VII. 1959, ♀ (leg. K. MALSKI); 18. VII. 1960, ♀.

V. Trzy Korony 6. VII. 1957, ♀; 15. VIII. 1958, ♀ — Nanowe 8. VIII. 1960, ♀♀.

37. ***A. combinata*** (CHRIST)

II. Kosarzyska 16. VI. 1958, ♀; 18. VIII. 1960, ♀.

VI. Grabczycha 20. VI. 1961, ♀ — Goła Góra 20. V. 1958, ♂ — Zamczysko 25. V. 1958.

VIII. Sromowce Niżne 25. VI. 1961, ♀.

38. ***A. albofasciata*** THOMS.

V. Pieniński Potok Valley 15. VI. 1961, ♂♂ — In a glade in Gojny Las 13. VI. 1961, ♂.

VIII. Sromowce Niżne 15. VI. 1958, ♂.

39. ***A. wilkella*** (K)

VI. Wyżni Łazek 16. VI. 1958, ♀ — Kosarzyska 18. VII. 1960, ♀.

V. Szopka Pass 3. VII. 1957, ♀ — Nanowe 8. VIII. 1960, ♀♀.

VI. Ostra Skała 15. VI. 1958, ♀ on *Vicia* L.

Genus: *Panurgus* Pz.

1. ***P. calcaratus*** (SCOP.)

V. In a glade in Gojny Las 6. VIII. 1959, ♀♀ on *Leonthodon* L.; 13. VIII. 1960, ♀ on *Leonthodon* L.; 15. & 16. VIII. 1960, ♀♀ on *Leonthodon hispidus* L. — Sobczański Glen 17. VI. 1958, ♀; 10. VII. 1961, ♀ — Nanowe 8. VIII. 1960, ♀.

VI. Kotłowa Dolina 8. VIII. 1960, ♀♀; 26. VIII. 1957, ♀.

VIII. Sromowce Niżne 17. VIII. 1960, ♀♀ on *Leonthodon hispidus* L.

Family: *Halictidae*

Genus: *Halictus* LATR.

1. ***H. rubicundus*** (CHRIST)

V. Nanowe 19. VI. 1961, ♀.

VIII. Sromowce Niżne 14. V. 1960, ♀ on *Taraxacum officinale* L. — Kras 17. IV. 1959, ♀♀ *Salix* L.

2. ***H. simplex*** (PÉR.)

III. Gojny Las 28. V. 1958, ♀; 21. VIII. 1959, ♂♀♀.

IV. Gorge of the Dunajec River 21. VIII. 1959, ♂♂ — Ligarki 10. VIII. 1960, ♀; 18. VII. 1958, ♀ — Kosarzyska 16. VI. 1958, ♀; 17. VII. 1959, ♀ (leg. K. MALSKI).

V. In a glade in Gojny Las 6. VII. 1959, ♂♀♀ on *Centaurea* L. and on *Leonthodon* L.; 6. VIII. 1959, ♀ on *Carduus* L.; 15. & 16. VIII. 1960, ♀♀ on *Leonthodon* L. — Nowa Góra 12. VIII. 1959, ♂♀ — Nanowe 8. VIII. 1960, ♀♀ — Obłaźnia Góra 13. VIII. 1959 on *Carduus* L.

VI. Grabczycha 12. VI. 1958, ♀; 12. VI. 1961, ♀♀ on *Scabiosa* L.; 13. VI. 1959, ♀; 13. VI. 1961, ♀♀ on *Scabiosa* L.; 15. VI. 1958, ♀♀; 20. VI. 1961, ♀♀; 21. VI. 1958, ♀♀; 5. VII. 1961, ♀; 6. VII. 1961, ♀♀; 23. VII. 1960, ♂; 5. VIII. 1959, ♂♀ on *Allium* L.; 5. VIII. 1960, ♂♂♀♀ on *Scabiosa* L. and *Campanula* L.; 6. VIII. 1959, ♂♂♀ on *Campanula* L. and on *Anthemis tinctoria* L.; 11. VIII. 1960, ♂♂♀♀ on *Campanula* L.; 13. VIII. 1959, ♀; 16. VIII. 1959, ♂♀♀; 23. VIII. 1959, ♂♂♀; 24. VIII. 1959, ♂♂♀, 10. VIII. 1959, ♂♂ on *Scabiosa* L.; 16. VIII. 1960, ♀; 27. VIII. 1959, ♂ on *Leonthodon* L.; 4. IX. 1959, ♂♂. — Ostra Skała 21. VI. 1958, ♀♀ on *Scabiosa* L.; 16. & 17. VII. 1957, ♂♀♀ on *Campanula* L.; 5. VII. 1957, ♀ on *Echium vulgare* L.; 15. VIII. 1960, ♂; 21. VIII. 1957, ♀; 24. VIII. 1957, ♀♀ — Podskalnia Góra 1. VII. 1961, ♀; 12. VII. 1961, ♂ — Goła Góra 28. VIII. 1959, ♂♂ on *Mentha* L. — Zamczysko 11. VII. 1961, ♀; 21. VII. 1961, ♂♂♀♀; 13. VIII. 1959, ♂♂♀♀ on *Thymus* L. and *Mentha* L. — Pieniński Potok Valley 16. VI. 1961, ♀.

VIII. Sromowce Niżne VII. 1957, ♂ (leg. S. BŁESZYŃSKI) — Wielka Polana 10. VII. 1957, ♀; 7. VII. 1957, ♀ — Kąty 13. VIII. 1959, ♀♀ on *Carduus* L

3. ***H. maculatus*** SM.

V. In a glade in Gojny Las 25. VI. 1958, ♀.

VI. Sobczański Glen 11. VII. 1957, ♀ — Podskalnia Góra 17. V. 1960, ♀ — Kotłowa Valley 15. V. 1958, ♀ — Macelowa Valley 23. V. 1958, ♀ — Zamczysko 13. V. 1960, ♀ on *Fragaria* L.; 11. VII. 1961, ♀.

VII. Sromowce Niżne 16., 17. & 18. V. 1960, ♀♀ on a stony village street near the nests and on *Taraxacum officinale* L.; 22. V. 1958, ♀. — Magierowa Skałka 17. V. 1958, ♀ on *Taraxacum officinale* L. — Pod Nowe 28. V. 1959, ♀♀.

4. ***H. tumulorum*** (L.)

III. Kopa Siana 18. V. 1958, ♀.

V. Pieniński Potok Valley 20. V. 1960, ♀♀ on *Veronica chamaedris* L.; Szopka Pass 15. VI. 1961, ♀ — Nowa Góra 15. V. 1958, ♀ — Nanowe 10. VI. 1961, ♀ — Zamkowa Góra ad Czorsztyn 13. IV. 1961, ♀ on *Tussilago farfara* L.; 16. VI. 1962, ♀.

VI. Goła Góra 9. VI. 1961, ♀♀; 14. VII. 1961, ♀; 11. VIII. 1959, ♀♀ — Podskalnia Góra 17. V. 1960, ♀♀ — Pod Nowe 28. VIII. 1959, ♂ — Zamczysko 13. V. 1960, ♀♀ on *Fragaria* L.; 13. VIII. 1959, ♂♀♀ on *Thymus* L. and *Mentha* L.; 21. VI. 1961, ♀ — Zamkowa Góra 25. V. 1958, ♀.

VII. Sromowce Niżne 17. V. 1960, ♀ on *Taraxacum officinale* L. — Magierowa Skałka 17. V. 1958, ♀♀ on *Taraxacum officinale* L. — Gorge of the Dunajec River 16. VI. 1961, ♀♀ flying over the sand by the river.

VIII. Sromowce Niżne 15. VI. 1958 ♀; 17. V. 1958 ♀ — Kąty 13. V. 1960 ♀♀ on *Taraxacum officinale* L.

5. ***H. nitidus*** (Pz.)

V. In a glade in Gojny Las 25. VI. 1958, ♀ — Nowa Góra 15. V. 1958, ♀ — Obłaźna Góra 13. VIII. 1959, ♂.

VI. Ostra Skała 20. VI. 1958, ♀♀ on *Echium vulgare* L.

VII. Sromowce Niżne 14. V. 1960, ♀ on *Taraxacum officinale* L.; 17. V. 1958, ♀♀ — Gorge of the Dunajec River 16. V. 1960, ♀ on *Myosotis* L.

6. ***H. quadrinotatus*** (K.)

VIII. Sromowce Niżne 5. VII. 1957, ♀.

7. ***H. lativentris*** (Schenck)

V. In a glade in Gojny Las 20. VI. 1961, ♀; 15. VIII. 1960, ♀ — Pieniński Potok Valley 20. V. 1960, ♀ on *Taraxacum officinale* L. and *Cardamine* L.

VI. Podskalnia Góra 29. VI. 1961, ♀ — Goła Góra 9. VI. 1961, ♀.

VIII. Gorge of the Dunajec River 16. V. 1960, ♀ on *Myosotis* L. — Sromowce Niżne 4. VII. 1957, ♀.

8. ***H. leucozonius*** (Schrank)

Pieniny Mts., ♀♀ (leg. Sitowski).

V. Szopka Pass 10. VII. 1961, ♀ — Obłaźna Góra 13. VIII. 1959, ♂..

VI. Ostra Skała 21. VI. 1958, ♀ on *Coronilla varia* L.

VII. Sromowce Niżne 8. VI. 1961, ♀♀; 15. VI. 1958, ♀♀; 20. VI. 1958, ♀♀.

9. ***H. villosulus*** (K.)

V. In a glade in Gojny Las 6. VIII. 1959, ♂♂♀ on *Leonthodon* L.; 15. VIII. 1960, ♀; Pieniński Potok Valley 21. V. 1958, ♀ on *Caltha palustris* L.; 20. VII. 1959, ♀ (leg. K. Malski).

VI. Grabczycha 13. VI. 1961, ♀♀ — Podskalnia Góra 29. VI. 1961, ♀ — Pieniński Potok Valley 4. V. 1960, ♀ on *Ribes grossularia* L.

VII. Sromowce Niżne 20. VI. 1958, ♀♀; 17. VIII. 1960, ♂♀♀ on *Leonthodon* L.

VIII. Wielka Polana 7. VII. 1957, ♀.

10. ***H. lecopus*** (K.)

II. Ociemne Valley 20. VII. 1960, ♀ — Goła Góra 7. VIII. 1959, ♀.

III. Gojny Las 21. VIII. 1959, ♀ — Kopa Siana 18. V. 1958, ♀.

V. Nanowe 28. VIII. 1959, ♀ — Nowa Góra 15. V. 1958, ♀ — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♀♀ — Pieniński Potok Valley 20. V. 1960, ♀♀ on *Veronica chamaedris* L.

VI. Grabczycha 19. V. 1958, ♀♀; 13. VI. 1961, ♀ on *Scabiosa* L.; 21. V. 1960, ♀; 26. VI. 1961, ♀; 5. VII. 1960, ♀ on *Anhemis tinctoria* L.; 15. VII. 1958, ♀; 5. VIII. 1959, ♀; 5. VIII. 1960, ♀♀ on *Campanula* L.; 6. VIII. 1959, ♀♀ on *Vicia* L.; 10. VIII. 1959, ♀; 11. VIII. 1960, ♀♀ on *Campanula* L.; 24. VIII. 1957, ♂♂♀♀; 27. VIII. 1957, ♂ (leg. K. Malski); 4. IX. 1959, ♂♂♀; 23. IX. 1960, ♂♂ — Ostra Skała 21. VI. 1957, ♂; 5. & 10. VII. 1957, ♀♀ — Sobczański Glen 18. V. 1958, ♀ on *Campanula* L. — Goła Góra 17. V. 1960, ♀; 18. V. 1960, ♀; 9. VI. 1961; 11. VIII. 1959, ♂; 28. VIII. 1959, ♂ on *Mentha* L. — Podskalnia Góra 8. VI. 1961, ♀ — Czerwone Skałki 3. V. 1960, ♀♀ on *Taraxacum* L. — Zamczysko 13. V. 1960, ♀♀ on *Fragaria* L.; 11. VII. 1961, ♂♀♀; 13. VIII. 1959, ♀ on *Thymus* L.

VII. Sromowce Niżne 22. V. 1958, ♀ — Podnowe 15. V. 1958, ♀.

VIII. Sromowce Niżne 10. V. 1960, ♀ on *Taraxacum officinale* L.; 17. & 20. V. 1958, ♀♀; 17. VIII. 1960, ♀♀ — Kąty 13. VIII. 1959, ♀ on *Thymus* L. — Czorsztyn 14. VI. 1960, ♀ on *Salix* L.

11. ***H. intermedius*** Schenck

VI. Grabczycha 6. VIII. 1959, ♂ on *Scabiosa* L. — Sobczański Glen 3. VII. 1957, ♀.

VIII. Gorge of the Dunajec River 16. VI. 1961, ♀♀ flying over the sand by the river.

12. ***H. leucidulus*** (Schenck)

VI. Ostra Skała 15. VIII. 1960, ♀.

13. ***H. rufitarsis*** Zett.

VI. Pieniński Potok Valley 16. VI. 1961, ♀.

14. ***H. niger*** Vier.

II. Stolarzówka 18. IV. 1959, ♀ on *Salix* L.

IV. Wyżni Łazek 22. VI. 1961, ♀ — Ligarki 16. VI. 1958, ♀.

V. Szopka Pass 10. V. 1960, ♀♀ on *Taraxacum officinale* L.; 18. V. 1958, ♀ on *Campanula* L. — Nanowe 8. VIII. 1960, ♀ — Nowa Góra 16. IV. 1959, ♀ on *Salix* L. — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♀♀ on *Salix caprea* L. — Pieniński Potok Valley 20. V. 1960, ♀♀ on *Myosotis* L. and *Cardamine* L.

VI. Grabczycha 20. VI. 1961, ♀; 23. VII. 1960, ♂; 5. VIII. 1959, ♂ on *Vicia* L.; 6. VIII. 1959, ♂ — Ostra Skała 6. VII. 1957, ♀ on *Geranium* L.; 15. VIII. 1960, ♀ — Podskalnia Góra 17. V. 1960, ♀ — Goła Góra 20. V. 1958, ♀ — Zamczysko 21. VI. 1961, ♀; 11. VII. 1961, ♀♀ — Pieniński Potok Valley 4. V. 1960, ♀♀ on *Petasites officinalis* L. — Góra Zamkowa 12. V. 1960, ♀; 23. V. 1958, ♀.

VII. Gorge of the Dunajec River 4. V. 1960, ♀ on *Taraxacum officinale* L.

VIII. Sromowce Niżne 14. V. 1960, ♀♀ on *Salix* L. — Czorsztyn 14. IV. 1960, ♀♀ on *Salix* L. — Kras 17. IV. 1959, ♀♀ on *Salix* L. — Czorsztyn 14. IV. 1960 on *Tussilago farfara* L. and on *Salix caprea* L.

15. ***H. fulvicornis*** (K.)

IV. Kosarzyska 10. VIII. 1960, ♀ — Wyżni Łazek 22. VI. 1961, ♀ — Gorge of the Dunajec River 21. VIII. 1959, ♂.

V. Sobczański Glen 17. V. 1960, ♀ on *Taraxacum officinale* L. — Pieniński Potok Valley 20. V. 1960, ♀♀ on *Cardamine* L.; 15. VI. 1961, ♀ — Szopka Pass 10. V. 1960, ♀♀ on *Taraxacum officinale* L.; 18. V. 1958, ♀ on *Campanula* L. — Nanowe 8. VIII. 1960, ♀ — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♀♀ on *Salix caprea* L.

VI. Grabczycha 16. IV. 1959, ♀ on *Salix* L.; 28. IV. 1960, ♀♀ on *Taraxacum officinale* L.; 14. VIII. 1957, ♀ — Ostra Skała 27. VIII. 1959, ♂ on *Leonthodon* L. — Goła Góra 28. VIII. 1958, ♀ — Czerwone Skałki 3. V. 1960, ♀♀ on *Taraxacum officinale* L. — Zamczysko 21. VI. 1961, ♀; 13. VIII. 1959, ♀ on *Thymus* L. and *Mentha* L. — Pieniński Potok Valley 15. IV. 1959, ♀ on *Salix* L.; 4. V. 1960, ♀♀ on *Petasites officinalis* L. — Góra Zamkowa 25. V. 1958, ♀ — Kotłowa Valley 26. VIII. 1959, ♂.

VII. Sromowce Niżne 22. V. 1958, ♀ — Podnowe 15. V. 1958, ♀♀ on *Leonthodon* L.

VIII. Gorge of the Dunajec River 4. V. 1960, ♀♀ on *Taraxacum officinale* L.; 16. VI. 1961, ♀ flying over the sand by the river side — Wielka Polana 16. V. 1958, ♀ — Sromowce Niżne 10. & 14. V. 1960, ♂♀♀ on *Taraxacum officinale* L. and *Salix*. L — Sromowce Średnie 14. IV. 1960, ♀♀ on *Salix* L. — Kras 17. IV. 1959, ♀♀ on *Salix* L.; 17. IV. 1960, ♀ on *Salix* L. (leg. K. Malski).

16. ***H. laticeps*** Schenck

IV. Wyżni Łazek 25. VI. 1958, ♀.

V. In a glade in Gojny Las 6. V. 1960, ♀ on *Taraxacum officinale* L.; 6. VII. 1957, ♀; 16. VIII. 1960, ♀ on *Leonthodon* L. — Sobczański Glen 17. V. 1960, ♀♀ on *Taraxacum officinale* L. — Szopka Pass 18. V. 1958, ♀♀; 9. VII. 1957, ♀ — Nowa Góra 23. VIII. 1959, ♀ — Obłaźna Góra 13. VIII. 1959, ♂ — Rabsztyn 13. VIII. 1959, ♀ — Macelak 13. VIII. 1959, ♂♀ — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♀♀ on *Salix caprea* L.

VI. Grabczycha 6. VII. 1959, ♀ on *Scabiosa* L.; 6. VII. 1961, ♀; 21. V. 1960, ♀; 5; VIII. 1960, ♂♀♀ on *Vicia* L.; 6. VIII. 1959, ♂ on *Anthemis tinctoria* L.; 11. VIII. 1960, ♀♀ on *Campanula* L.; 24. VIII. 1957, ♀; 24. VIII. 1959, ♂ — Ostra Skała 25. VI. 1958, ♀; 15. VIII. 1960, ♀; 21. VIII. 1957, ♂; 27. VIII. 1959, ♂♂ — Podskalnia Góra 8. VI. 1961, ♀; 1. VII. 1961, ♀ — Goła Góra 5. V. 1960, ♀; 18. V. 1960, ♀; 28. VIII. 1959, ♂ — Czerwone Skałki 3. V. 1960, ♀♀ on *Taraxacum officinale* L. and *Salix* L. — Kotłowa Dolina 15. V. 1958, ♀ — Zamczysko 21. VI. 1961, ♀ — Pieniński Potok Valley 15. IV. 1959, ♀ on *Salix* L. — Zamkowa Góra 23. V. 1958, ♀.

VII. Sromowce Niżne 18. V. 1960, ♀♀ on a stony village street; 14. V. 1960, ♀ on *Salix* L.; 17. VIII. 1960, ♀ on *Leonthodon* L. — Pod Nowe 28. VIII. 1959, ♀.

VIII. Wielka Polana 5. V. 1960, ♀♀ on *Taraxacum officinale* L. — Sromowce Niżne 14. V. 1960, ♀♀ on *Taraxacum officinale* L. and *Salix* L. — Czorsztyn 14. IV. 1960, ♀ on *Salix* L. — Kras 14. & 17. IV. 1959, ♀♀ on *Salix* L.

17. ***H. aeneidorsum*** Alfken

V. Nanowe 8. VIII. 1960, ♀ — Nowa Góra 15. V. 1958, ♀ — Obłaźna Góra 13. VIII. 1959, ♀ — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♀♀ on *Salix caprea* L.

VI. Grabczycha 13. VI. 1961, ♀; 23. VI. 1961, ♀; 28. VI. 1960, ♀ on *Taraxacum officinale* L.; 6. VII. 1961, ♀; 19. V. 1958, ♀; 23. VII. 1960, ♀; 5. & 6. VIII. 1959, ♂♀♀ on *Scabiosa* L. and *Campanula* L.; 11. VIII. 1960, ♀; 24. VIII. 1959, ♂♀♀ — Ostra Skała 27. VIII. 1957, ♀ (leg. K. Malski); 27. VIII. 1959, ♀ on *Leonthodon* L. — Podskalnia Góra 17. V. 1960, ♀ — Goła Góra 18. V. 1960, ♀; 22. V. 1958, ♀; 9. VI. 1961, ♀; 11. VIII. 1959, ♀; 28. VIII. 1959, ♀ — Zamczysko 13. V. 1960, ♀♀ on *Fragaria* L., *Thymus* L. and *Mentha* L.

18. ***H. calceatus*** (Scop.)

Pieniny Mts., ♀♀ (leg. Sitowski).

II. Bańkowy Gronik 24. V. 1957, ♂; 16. IV. 1959, ♀♀ on *Caltha palustris* L. — Stolarzówka 15. IV. 1959, ♀♀ on *Salix caprea* L.; 16. IV. 1959, ♀♀ on *Salix* L.; 18. IV. 1958, ♀ on *Salix* L.; 30. IV. 1961, ♀♀ *Cardamine* L. — Toporzysko 16. IV. 1959, ♀♀ on *Tussilago farfara* L. — Ociemne Brook Valley 21. IV. 1959, ♀ on *Taraxacum officinale* L. — Hudziary 24. V. 1957, ♀♀ (leg. Oleś) — Wymiarki 10. VII. 1961, ♀; 10. V. 1960, ♀ on *Salix* L. — Trzy Korony 13. VIII. 1957, ♀.

III. Pieniński Potok Valley 4. V. 1960, ♀♀ on *Petasites officinalis* L. — Gojny Las 4. IX. 1959, ♂; 18. VII. 1957, ♀ on *Digitalis* L. — Zamkowa Góra 25. V. 1958, ♀♀ — Trzy Korony 16. VIII. 1958, ♀ — Kopa Siana 18. V. 1958, ♀.

IV. Kosarzyska 21. V. 1957, ♀ — Wyżni Łazek 25. VI. 1958, ♀♀.

V. Szopka Pass 10. V. 1960, ♀♀ on *Taraxacum officinale* L.; 18. V. 1958, ♀♀ on *Campanula* L.; 16. VI. 1961, ♀; 3. VII. 1957, ♀; 10. VIII. 1960, ♂♂ — Sobczański Glen 17. V. 1960, ♀♀ on *Taraxacum officinale* L.; 18. V. 1958, ♀ on *Campanula* L. — Trzy Korony 22. VII. 1958, ♀; 15. VIII. 1958, ♂♂; 18. VIII. 1959, ♂ — In a glade in Gojny Las 6. V. 1960, ♀♀ on *Taraxacum officinale* L.; 19. V. 1958, ♀; 7. VII. 1957, ♀; 6. VII. 1957, ♀ on *Leonthodon* L. — Kotłowa Valley 15. V. 1958, ♀♀; 17. V. 1958, ♀; 25. V. 1958, ♀; 20. V. 1958, ♀ on *Caltha palustris* L.; 27. VIII. 1957, ♂ on *Carduus* L. — Macelowy Glen 7. VIII. 1960, ♀ — Cyrhla 5. V. 1960, ♀ — Nanowe 8. VIII. 1960, ♂♀♀; 18. V. 1958, ♀♀ on *Leonthodon* L.; 19. VII. 1957, ♂♀— Nowa Góra 27. VIII. 1957, ♂; 11. VII. 1957, ♀ — Obłaźna Góra 13. VIII. 1959, ♀♀ on *Carduus* L. — Góra Zamkowa ad Czorsztyn 16. VI. 1962, ♀ — Pieniński Potok Valley 15. IV. 1959, ♀♀ on *Salix* L. and *Caltha palustris* L.; 30. IV. 1961, ♀ on *Taraxacum officinale* L.; 20. V. 1960, ♀♀ on *Taraxacum officinale* L.; 15. VI. 1961, ♀; 10. VII. 1961, ♀.

VI. Grabczycha 16. V. 1958, ♀; 18. V. 1960, ♀; 12. VI. 1961, ♀♀; 13. VI. 1961, ♀ on *Ranunculus* L.; 21. VI. 1958, ♀♀; 6. VII. 1961, ♀; 14. VII. 1959, ♀ (leg. K. Malski); 5. VIII. 1960, ♀; 24. VIII. 1959, ♂; 27. VIII. 1957, ♀ (leg. K. Malski) — Ostra Skała 20. V. 1958, ♀; 13. & 15. VI. 1961, ♀♀; 21. VI. 1958, ♀ on *Coronilla varia* L.; 24. VIII. 1957, ♀; 27. VIII. 1959, ♂♂ — Sobczański Glen 10. V. 1960, ♀ on *Taraxacum officinale* L.; 11. VII. 1957, ♀; 17. VII. 1957, ♂♀♀ — Podskalnia Góra 29. VI. 1961, ♀♀; 1. VII. 1961, ♀♀ — Goła Góra 9. VI. 1961, ♀♀; 20. VII. 1958, ♀♀; 10. VIII. 1959, ♂; 28. VIII. 1959, ♂♂ on *Mentha* L. — Czerwone Skałki 3. V. 1960, ♀ — Zamczysko 13. V. 1960, ♀♀ on *Fragaria* L.; 11. VII. 1961, ♂♀♀ — Pieniński Potok Valley 17. V. 1960, ♀ on *Taraxacum officinale* L.; 16. VI. 1961, ♀; 10. VII. 1960, ♀; 21. VII. 1959, ♀.

VII. Magierowa Skałka 17. V. 1958, ♀♀ on *Taraxacum officinale* L. — Podnowe 15. V. 1958, ♀♀ on *Leonthodon* L.

VIII. Sromowce Niżne 6. & 10. V. 1960, ♀♀ on *Taraxacum officinale* L.; 14. V. 1960, ♀♀ on *Salix* L. and *Taraxacum officinale* L.; 17. V. 1958, ♀♀; 19. & 20. V. 1958, ♀♀ — Wielka Polana 5. V. 1960, ♀♀ on *Taraxacum officinale* L. — Kąty 13. V. 1960, ♀♀ — Czorsztyn 14. IV. 1960, ♀♀ on *Salix* L. — Krościenko 14. IV. 1960, ♀♀ on *Salix* L. — Kras 17. IV. 1959, ♀♀ on *Salix* L.; 13. V. 1960, ♀ — Gorge of the Dunajec River 4. V. 1960, ♀♀ on *Taraxacum officinale* L.; 16. V. 1960, ♀♀ on *Taraxacum officinale* L. and flying over the sand by the river side; 16. VI. 1961, ♀♀.

19. ***H. albipes*** (FABR.)

II. Stolarzówka 16. IV. 1959, ♀♀ on *Salix caprea* L. and *Salix* L.; 18. IV. 1958, ♀♀ on *Salix* L. — Toporzysko 21. IX. 1960, ♀ — Ociemne Brook Valley 20. VII. 1960, ♀ — Trzy Korony 23. VIII. 1957, ♂ — Wymiarki 10. VII. 1961, ♀ — Goła Góra 7. VIII. 1959, ♀♀.

III. Trzy Korony 28. V. 1958, ♀ — Pieniński Potok Valley 23. VIII. 1957, ♂ (leg. K. MALSKI).

IV. Kosarzyska 18. VII. 1960, ♀ — Ligarki 12. VI. 1960, ♀ (leg. K. MALSKI); 16. VI. 1958, ♀♀ — Wyżni Łazek 10. VIII. 1960, ♀; 22. VI. 1961, ♀.

V. Trzy Korony 16. VI. 1958, ♀ — Sobczański Glen 17. V. 1960, ♀ on *Taraxacum officinale* L.; 18. V. 1958, ♀ on *Campanula* L. — In a glade in Gojny Las 6. V. 1960, ♀♀ on *Taraxacum officinale* L.; 19. V. 1958, ♀ — Nowa Góra 15. V. 1958, ♀; 12. VIII. 1959, ♂; 23. VIII. 1959, ♀ — Szopka Pass 10. V. 1960, ♀♀ on *Taraxacum officinale* L.; 15. VI. 1961, ♀♀ — Czoło 11. VII. 1957, ♀ on *Cichorium intybus* L. — Rabsztyn 13. VIII. 1959, ♂ — Nanowe 18. V. 1958, ♀; 10. VI. 1961, ♀♀; 8. VIII. 1960, ♀ — Pieniński Potok Valley 30. IV. 1961, ♀ on *Taraxacum officinale* L.; 4. V. 1960, ♀ on *Petasites officinalis* L.; 9. V. 1960, ♀ on *Salix* L.; 20. V. 1960, ♀♀ on *Taraxacum officinale* L. and *Veronica chamaedris* L.; 15. VI. 1961, ♀; 10. VII. 1961, ♀.

VI. Grabczycha 12. VI. 1961, ♀♀; 19. VI. 1958, ♀; 20. VI. 1961, ♀♀; 6. VII. 1961, ♀; 5. VIII. 1960, ♀; 16. VIII. 1960, ♂ — Ostra Skała 13. VI. 1961, ♀; 20. VI. 1958, ♀♀ on *Echium vulgare* L.; 21. VI. 1961, ♀; 20. VI. 1958, ♀; 25. VI. 1958, ♀♀; 27. VI. 1961, ♀; 5. VII. 1957, ♀; 17. VII. 1957, ♂; 27. VIII. 1959, ♀ — Sobczański Glen 10. V. 1960, ♀ on *Taraxacum officinale* L.; 15. VI. 1961, ♀; 17. VII. 1957, ♀ — Podskalnia Góra 17. V. 1960, ♀♀; 8. VI. 1961, ♀; 18. VII. 1961, ♀ — Czerwone Skałki 3. V. 1960, ♀ on *Taraxacum officinale* L. — Zamczysko 13. V. 1960, ♀ on *Fragaria* L.; 11. VII. 1961, ♀ — Pieniński Potok Valley 10. VII. 1960, ♀; 21. VIII. 1958, ♀.

VIII. Sromowce Niżne 6. V. 1960, ♀ on *Taraxacum officinale* L.; 14. V. 1960, ♀♀ on *Salix* L.; 16. V. 1960, ♀; 15. VI. 1958, ♀; 4. VII. 1961, ♀; 17. VIII. 1960, ♂ on *Leontodon* L. — Wielka Polana 5. V. 1960, ♀ on *Taraxacum officinale* L.; 20. V. 1958, ♀♀ on *Taraxacum officinale* L.; 8. VII. 1957, ♀ — Kąty 13. VI. 1960, ♀ — Czorsztyn 14. IV. 1960, ♀♀ on *Salix* L. — Gorge of the Dunajec River 4. V. 1960, ♀ on *Taraxacum officinale* L.; 16. V. 1960, ♀ on *Taraxacum officinale* L.; 16. VI. 1961, ♀♀.

20. ***H. laevis*** (K.)

VI. Ostra Skała 27. VIII. 1959, ♂.

VIII. Kras 17. VI. 1959, ♀ on *Salix* L.

Genus: *Sphecodes* LATR.

1. ***S. monilicornis*** (K.)

VI. Zamczysko 15. V. 1960, ♀; 13. VIII. 1959, ♂.

VIII. On a meadow at the foot of Klejowa Góra 30. VI. 1961, ♀.

2. ***S. pellucidus*** SM.

VI. Podskalnia Góra 17. V. 1960, ♀.

VIII. Gorge of the Dunajec River 4. V. 1960, ♀ — Wielka Polana 19. V. 1958, ♀.

3. ***S. divisus*** (K.)

V. Cyrhla 8. V. 1960, ♀.

VI. Grabczycha 20. VII. 1961, ♀.

IV. Kosarzyska 21. V. 1957, ♀.

VIII. Sromowce Niżne 8. VI. 1961, ♀.

4. ***S. puncticeps*** Thoms.
V. Nanowe 19. VI. 1961, ♀.
VI. Grabczycha 5. VIII. 1960, ♀ — Goła Góra 28. VIII. 1959, ♂ on *Mentha* L.
5. ***S. ferruginatus*** Hag.
Pieniny Mts., ♂ (leg. Sitowski).
VI. Grabczycha 11. VIII. 1960, ♂; 4. IX. 1959, ♀ on *Chrysanthemum zawadzkii* Herb. — Goła Góra 8. V. 1960, ♀; 18. V. 1960, ♀♀ on *Fragaria* L.; 22. V. 1958, ♀ — Zamczysko 21. VI. 1961, ♀; 23. V. 1960, ♀♀ on *Fragaria* L. — Pieniński Potok Valley 1. VIII. 1959, ♀.
6. ***S. hyalinatus*** Hag.
VI. Grabczycha 17. V. 1960, ♀; 6. VIII. 1961, ♀; 10. VIII. 1959, ♀ — Podskalnia Góra 18. V. 1960, ♀♀ on *Fragaria* L. — Goła Góra 18. V. 1960 on *Fragaria* L. — Zamczysko 13. V. 1960, ♀ on *Fragaria* L.; 21. VI. 1961, ♀♀.
7. ***S. miniatus*** Hag.
VI. Goła Góra 18. V. 1960, ♀ — Pieniński Potok Valley 21. VIII. 1959, ♂.
8. ***S. fasciatus*** Hag.
VI. Ostra Skała 27. VIII. 1959, ♂.

Genus: *Dufourea* Lep.

1. ***D. vulgaris*** Schenck
V. In a glade in Gojny Las 6. VII. 1957, ♂; 6. VIII. 1959, ♀♀ on *Leonthodon* L. — Nanowe 8. VIII. 1960, ♂♂♀♀.
VI. Sobczański Glen 11. VII. 1957, ♀ — Kotłowa Valley 8. VIII. 1960, ♀♀ — Macelowy Glen 7. VIII. 1960, ♂ — Zamczysko 11. VII. 1961, ♂♂♀♀.
VII. Kąty 13. VIII. 1959, ♂ ♀♀.

Genus: *Halictoides* Nyl.

1. ***H. dentiventris*** (Nyl.)
Pieniny Mts., ♀ (leg. Sitowski).
III. Faćmiech 10. VII. 1957, ♀ — Gojny Las 5. VII. 1961, ♂♀; 8. VII. 1957, ♀♀; 6. VIII. 1957, ♀.
IV. Kosarzyska 18. VII. 1960, ♂.
V. Pieniński Potok Valley 10. VII. 1960, ♂ — In a glade in Gojny Las 6. VII. 1961, ♂♂ on *Campanula* L.; 6. VIII. 1959, ♀ on *Leonthodon* L. — Kotłowa Valley 26. VII. 1957, ♀.
VI. Grabczycha 27. VI. 1961, ♂ on *Campanula* L.; 6. VII. 1961, ♂♂; 17. VII. 1961, ♂♂♀♀ on *Campanula* L.; 5. VIII. 1960, ♂♂♀; 6. VIII. 1959, ♂ on *Campanula* L.; 11. VIII. 1960, ♀; 16. VIII. 1960, ♂♀ on *Campanula* L. — Ostra Skała 5. & 6. VII. 1957, ♂♂♀♀ on *Campanula* L.; 10. VII. 1957, ♂♂; 16. & 17. VII. 1957, ♂♂♀♀ on *Campanula* L. — Podskalnia Góra 1. VII. 1961, ♂ — Goła Góra 14. VII. 1961, ♂ — Zamczysko 11. VII. 1961, ♂.

Genus: *Rhophites* Spin.

1. ***R. quinquespinosus*** Spin.
III. Gojny Las 27. VI. 1961, ♂ on *Echium vulgare* L.; 6. VII. 1957, ♀.
V. Czoło 11. VII. 1957, ♀ on *Stachys germanica* L.
VI. Ostra Skała 5. VII. 1957, ♂ on *Campanula* L. — Sobczański Glen 6. VII. 1957, ♀ on *Stachys germanica* L. — Podskalnia Góra 1. VII. 1961, ♂♂ on *Echium vulgare* L.

Genus: *Rhophitoides* Schenck

1. ***R. canus*** (Ev.)
Pieniny Mts., ♂ (leg. Sitowski).
III. Gojny Las 22. VI. 1961, ♂.
V. Nanowe 8. VIII. 1960, ♀.
VI. Podskalnia Góra 1. VII. 1961, ♀♀.

Family: *Melittidae*

Genus: *Melitta* K.

1. ***M. leporina*** (Pz.)
III. Gojny Las 8. VII. 1957, ♀.
2. ***M. haemorrhoidalis*** (Fabr.)
II. Trzy Korony 5. VII. 1961, ♂ on *Campanula* L.
III. Gojny Las 6. VII. 1957, ♂♂; 8. VII. 1957, ♂♂.
V. In a glade in Gojny Las 5. VIII. 1960, ♀ on *Campanula* L.
VI. Grabczycha 5. VIII. 1960, ♂ on *Campanula* L.; 6. VIII. 1959, ♀♀ on *Campanula* L.; 11. VIII. 1960, ♀♀ on *Campanula* L.; 23. VIII. 1960, ♂ on *Campanula* L.; 24. VIII. 1957, ♀; Ostra Skała 6. & 10. VII. 1957, ♂♂♀♀ on *Campanula* L.; 16. VII. 1957, ♀ on *Campanula* L.
VII. Kąty 11. VI. 1961, ♂♂ on *Campanula* L.
VIII. Sromowce Niżne 4. VII. 1957, ♂ — In a meadow at the foot of Klejowa Góra 30. VI. 1961, ♂ on *Campanula* L.

Genus: *Macropis* Klug.

1. ***M. fulvipes*** (Fabr.)
VI. Ostra Skała 27. VI. 1961, ♂; 6. VII. 1957, ♀♀ on *Ranunculus* L.

Family: *Apidae*

Genus: *Nomada* Scop.

1. ***N. goodeniana*** (K.)
II. Toporzysko 16. IV. 1959, ♂ on *Tussilago farfara* L.
VI. Zamczysko 21. V. 1961, ♂.
VIII. Gorge of the Dunajec River 4. V. 1960, ♂ on *Taraxacum officinale* L.; 16. VI. 1961, ♀ flying over the sand by the river side.
2. ***N. lineola*** Pz.
V. Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂ on *Salix caprea* L.
VI. Zamczysko 21. V. 1961, ♀.
3. ***N. marshamella*** (K.)
II. Wymiarki 10. V. 1960, ♀ on *Salix* L. — Bańkowy Gronik 13. IV. 1959, ♂ on *Salix* L.
V. In a glade in Gojny Las 6. V. 1960 on *Taraxacum officinale* L. — Szopka Pass 12. V. 1960, ♂ on *Taraxacum officinale* L.
VI. Goła Góra 5. V. 1960, ♂ on *Prunus spinosa* L.

VIII. Sromowce Niżne 17. IV. 1959, ♀ — Krościenko 14. IV. 1959, ♀ — Kras 17. IV. 1959, ♂♀ on *Salix* L. — In a meadow at the foot of Klejowa Góra 4. V. 1960, ♂ on *Taraxacum officinale* L.

4. ***N. sexfasciata*** Pz.

VI. Podskalnia Góra 8. VI. 1960, ♀.

5. ***N. emarginata*** Mor.

VI. Grabczycha 6. VIII. 1959, ♂♂ on *Allium* L. and *Scabiosa* L.

6. ***N. guttulata*** Schenck

V. Pieniński Potok Valley 4. V. 1960, ♀ on *Taraxacum officinale* L.; 20. V. 1960, ♀♀ on *Taraxacum officinale* L.

VI. Podskalnia Góra 17. V. 1960, ♀.

VIII. Gorge of the Dunajec River 4. V. 1960, ♀ on *Taraxacum officinale* L.

7. ***N. zonata*** Pz.

VI. Zamczysko 21. V. 1961, ♀.

8. ***N. ruficornis*** (L.)

V. Pieniński Potok Valley 4. V. 1960, ♂♀ on *Tussilago farfara* L.

9. ***N. flava*** Pz.

V. Pieniński Potok Valley 15. IV. 1959, ♀ on *Salix* L.; 20. V. 1960, ♀ — Kotłowa Valley 15. V. 1958, ♂ — Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂ on *Salix caprea* L.

10. ***N. leucophtalma*** (K.)

V. Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂♂ on *Salix caprea* L.

VI. Goła Góra 23. V. 1958, ♀; 25. V. 1958, ♀.

11. ***N. ferruginata*** (L.)

VI. Sobczański Glen 20. V. 1960, ♀ — Kotłowa Valley 15. V. 1958, ♀♀ — Nowisko 20. V. 1958, ♀ — Zamkowa Góra 25. V. 1958, ♀.

VII. Sromowce Niżne 17. V. 1958, ♀; 18. V. 1960, ♀♀ on a stony village street; 23. V. 1958, ♀ — Magierowa Skałka 17. V. 1958, ♀♀ — Podnowe 15. V. 1958, ♀.

12. ***N. bifida*** Thoms.

II. Stolarzówka 16. IV. 1959, ♀ on *Salix carpea* L.

V. Pieniński Potok Valley 15. IV. 1959, ♂♀ on *Salix* L. — Góra Zamkowa ad Czorsztyn 3. IV. 1960, ♂♂♀♀ on *Salix caprea* L.

VIII. Gorge of the Dunajec River 4. V. 1960, ♂♂♀♀ on *Taraxacum officinale* L. and flying over the sand by the river side; 6. VI. 1960, ♂ on *Myosotis* L.

13. ***N. alboguttata*** H.-Sch.

VI. Podskalnia Góra 8. VI. 1960, ♀.

VIII. Krościenko 27. VI. 1962, ♀ — Gorge of the Dunajec River 4. V. 1960, ♀♀ on *Taraxacum officinale* L. and flying over the sand by the river side.

14. ***N. flaviguttata*** (K.)

V. Góra Zamkowa ad Czorsztyn 13. IV. 1960, ♂ on *Tussilago farfara* L.

VI. Sobczański Glen 18. V. 1960, ♀ on *Taraxacum officinale* L. — Podskalnia Góra 17. V. 1960, ♀♀; 8. VI. 1960, ♀♀; 10. VI. 1960, ♀; Goła Góra 18. V. 1960, ♀ — Zamczysko 21. V. 1960, ♂♀.

15. ***N. baeri*** Stoeckh.

VIII. Gorge of the Dunajec River 4. V. 1960, ♀ flying over the sand by the river side.

16. ***N. conjugens*** H.-Sch.

VI. Podskalnia Góra 1. VII. 1961, ♀.

17. ***N. fuscicornis*** Nyl.

VII. Sromowce Niżne 18. VIII. 1960, ♀♀ entering the nests of *Panurgus calcaeatus* (Scop.).

18. ***N. armata*** H.-Sch.
V. Trzy Korony 6. VII. 1957, ♂.
VII. Sromowce Niżne 17. V. 1958, ♂.

19. ***N. fabriciana*** (L.)
VI. Grabczycha 20. VI. 1961, ♀.

Genus: *Apis* L.

1. ***A. mellifica*** L.

II. A ZOOGEOGRAPHIC AND ECOLOGICAL ANALYSIS OF THE *COLLETIDAE* OF THE PIENINY MTS.

1. A comparison of the *Colletidae* of the Pieniny Mts. with this family in the Polish Carpathians and other regions of Poland

There are eleven species of the genus *Colletes* Latr. and twenty-two species of the genus *Prosopis* Jur. in the fauna of Poland. The distribution of these species in Poland is shown in table I. The accepted division of Poland is as follows:

I — Pieniny Mts.,
II — Tatra Mts.,
III — Carpathians (ranges other than the Pieniny Mts. and the Tatra Mts.),
IV — Silesia and Sudeten Mts.,
V — Central Poland,
VI — Northern Poland.

No member of the genus *Colletes* Latr. has been found in the Pieniny Mts. *C. succinctus* (L.) most likely does not occur in the Pieniny Mts. because of its preference for visiting *Calluna vulgaris* L. which does not grow in the region under consideration. *C. daviesanus* Sm. was recorded from the Carpathians (Zakopane) by S. Łoziński, in 1920; his record was based on the collection of Śnieżek. Moreover, J. Noskiewicz found *C. daviesanus* Sm. in the very close neighbourhood of the Pieniny Mts. Of eleven species of the genus *Colletes* Latr. found in Poland seven are very likely spread throughout Poland. Two species, *C. floralis* Ev., *C. impunctatus* Nyl. were found only in Central Poland. They are considered to be the Boreal-Alpine species and were recorded from Central Europe and the High Alps. Moreover, *C. floralis* Ev. was cited from the Pyrenees and the Transylvanian Alps. Both these species may be found in the Carpathians In Northern Poland occurs *C. balticus* Alfken (described from there), which has recently been found in Gołąb by the River Vistula (north of Puławy) (leg.

Table I

No.	Species	I	II	III	IV	V	VI
1.	*Colletes succinctus* (L.)				+	+	+
2.	*Colletes marginatus* Sm.				+	+	+
3.	*Colletes floralis* Ev.						+
4.	*Colletes impuctatus* Nyl.						+
5.	*Colletes daviesanus* Sm.			+	+	+	+
6.	*Colletes similis* Schenck				+	+	+
7.	*Colletes fodiens* Geoff.				+	+	+
8.	*Colletes balticus* Alfken						+
9.	*Colletes cunicularis* (L.)				+	+	+
10.	*Colletes nasutus* Sm.				+	+	+
11.	*Colletes inexpectatus* Nosk.					+	
12.	*Prosopis signata* (Pz.)				+	+	+
13.	*Prosopis gibba* (Saund.)				+	+	+
14.	*Prosopis confusa* (Nyl.)	+	+	+	+	+	+
15.	*Prosopis styriaca* (Först.)				+		
16.	*Prosopis variegata* (F.)			+	+	+	+
17.	*Prosopis brevicornis* (Nyl.)	+			+	+	+
18.	*Prosopis pectoralis* (Nyl.)				+		+
19.	*Prosopis pictipes* (Nyl.)				+	+	+
20.	*Prosopis sinuata* Schenck	+		+	+	+	+
21.	*Prosopis clypearis* Schenck					+	
22.	*Prosopis annulata* (L.)		+		+		
23.	*Prosopis communis* (Nyl.)	+		+	+	+	+
24.	*Prosopis angustata* Schenck			+	+	+	?
25.	*Prosopis bisinuata* (Först.)					+	+
26.	*Prosopis gracilicornis* Mor.				+	+	
27.	*Prosopis nigrita* (Fabr.)	+		+	+	+	+
28.	*Prosopis difformis* (Ev.)	+		+	+	+	+
29.	*Prosopis annularis* (K.)			+	+	+	+
30.	*Prosopis rinki* Górski				+	+	+
31.	*Prosopis cornuta* (Curt.)		+			+	
32.	*Prosopis punctulatissima* (Sm.)				+	+	
33.	*Prosopis hyalinata* (Sm.)	+			+	+	+

J. Noskiewicz). A rather interesting xerothermophil species is *C. inexpectatus* Nosk. which was found on the border of the Subcarpathian Region and Sandomierz Lowland in Przemyśl (Krysiński, 1957), in Jarosław (leg. Noskiewicz), Przeworsk (leg. Puławski), Sandomierz, and recently in Kazimierz on the River Vistula (leg. Noskiewicz). Another xerothermophil species, of south-eastern origin, *C. nasatus* Sm. was found in Northern Poland and in Poznań region.

Seven members of the genus *Prosopis* Jur. have been found in the Pieniny Mts. Of these, three are new to the Polish Carpathians fauna, namely, *P. brevicornis* (Nyl.), *P. communis* (Nyl.) and *P. hyalinata* (Sm.). *P. communis* (Nyl.) was additionally found in Czarny Dunajec, distr. Nowy Targ (coll. Stach). The remaining four species were reported from other ranges of the Polish Carpathians.

P. confusa (NYL.) was cited from Toporowa Cyrhla in the Tatra Mts. (NOSKIEWICZ, 1920) and from Żegiestów (Beskid Sądecki Range) (ŚNIEŻEK, 1910). *P. variegata* (FABR.) was found in Poręba Wielka in Gorce Mts. (ŚNIEŻEK, 1910) and *P. sinuata* SCHENCK was recorded from Żegiestów (ŚNIEŻEK, 1910). It is, however, of interest to note that the specimens recorded by ŚNIEŻEK have not been found in his collection. *P. annulata* (L.) was found in Jaszczurówka in the Tatra Mts. by NOSKIEWICZ (1920) and there are specimens of this species from the Gorce Mts. in the ŚNIEŻEK collection. Moreover, this species is known from the Belanske Tatra Mts. (ZAWADIL, 1951). The records on the occurrence of *P. annulata* (L.) in Kraków given by ŁOZIŃSKI (1920) and ŚNIEŻEK (1910) are wrong as after thorough examination the respective specimens have proved to be *P. communis* (NYL.). *P. angustata* SCHENCK, according to ŚNIEŻEK (1910) occurs in Żegiestów, however, the respective specimens are missing from the ŚNIEŻEK collection. *P. nigrita* (FABR.) was recorded by ŚNIEŻEK (1910) from Mszana Dolna in the Gorce Mts., however, there are no specimens in his collection. *P. difformis* EV. was reported by ŚNIEŻEK (1910) from Mszana Dolna and Poręba Wielka and *P. annularis* (K.) was cited by that author on the basis of the WIERZEJSKI collection, however, the latter species is missing from both collections of WIERZEJSKI and ŚNIEŻEK. Moreover, *P. cornuta* SM. was reported from the Czechoslovakian Tatra Mts. by BALTHASAR, in 1952. The species of the genus *Prosopis* JUR., except for *P. annulata* (L.) and *P. cornuta* (CURT.), very likely occur throughout Poland. *P. angustata* SCHENCK has not as yet been found in Nothern Poland, however it should be found in that region as it was recorded from Northern Europe by STOECKHERT, in 1932. Because of rather poor data on the occurrence of the members of the genus *Prosopis* JUR. in the Polish Carpathians, it is difficult to prove their vertical distribution in that region. Four species occur throughout Poland except for the Carpathians, but at least some of them should be found in the Beskidy Range. The remaining species of the genus *Prosopis* JUR. were found in Poland in a few localities, thus *P. styriaca* (FÖRST.) was found in Silesia, *P. clypearis* SCHENCK in the Poznań region, *P. pectoralis* (FÖRST.) in Silesia, Pomerania and Mazurian Lake District, *P. bisinuata* (FÖRST.) in Central and Nothern Poland, *P. gracilicornis* MOR. in the Wrocław region and in Łowicz, and *P. punctulatissima* (SM.) in the Wrocław region (leg. NOSKIEWICZ) and in Central Poland (Kraków, Łowicz and Skarżysko-Kamienna).

2. A zoogeographic analysis of the species of the genus *Prosopis* JUR. occurring in the Pieniny Mts.

The members of the genus *Prosopis* JUR. found in the Pieniny Mts. are widely spread in Europe, and some of them were reported also from Asia (STOECKHERT, 1932). *P. hyalinata* (SM.) was found only in Europe. *P. sinuata*

SCHENCK was reported from Central and Southern Europe and from North Africa. *P. difformis* NYL. occurs in the steppes of South-Eastern Europe and in Central Europe. The remaining four species are known also from Asia. *P. communis* (NYL.) occurs in Europe and Northern Asia. *P. brevicornis* (NYL.) was recorded from Europe, North Africa, and Central Asia. *P. confusa* (NYL.) was found in Europe, North Africa, Central Asia, Asia Minor and Manchuria. *P. nigrita* (FABR.) is probably widely spread in the Palaearctic Region as it is found in China.

3. An ecological characteristic in the species of the genus *Prosopis* JUR. in the Pieniny Mts.

The distribution of the members of the genus *Prosopis* JUR. in the individual habitats (marked I—VIII) in the Pieniny Mts. is shown in table II.

Table II

No.	Species	I	II	III	IV	V	VI	VII	VIII
1.	*Prosopis confusa* (NYL.)			+	+	+	+		
2.	*Prosopis brevicornis* SCHENCK						+		
3.	*Prosopis sinuata* SCHENCK						+		
4.	*Prosopis communis* (NYL.)					+	+	+	
5.	*Prosopis nigrita* (FABR.)					+	+		
6.	*Prosopis difformis* EV.			+	+	+		+	+
7.	*Prosopis hyalinata* (SM.)		+			+	+		

The only species found on the northern slope of the Pieniny Mts. is *P. hyalinata* (SM.) which was collected in a meadow in the Ociemne Valley. The remaining species were found only on the southern slope in the warmest localities, thus in the meadows (V) and in the screes (VI). Due to the climate of the northern slope of the Pieniny Mts., which is similar to that of the Carpathians in general and to that in the lower regions in the Tatra Mts., in the northern slope of the Pieniny Mts. may occur species found in the Tatra Mts. (compare discussion on the *Megachilidae* in the part I of this study, DYLEWSKA, 1962). Thus, *P. confusa* (NYL.) is expected to occur on the northern slope of the Pieniny Mts., and *P. hyalinata* (SM.) may be found in other ranges of the Polish Carpathians with Tatra Mts. inclusive. *P. confusa* (NYL.) and *P. difformis* EV., which are most abundant in the region in question, were also found in well insolated woods on the southern slopes (III) and in the glades of the Trzy Korony massif (IV) as well. The only species which has not been found in the screes of the southern slope (VI), is *P. difformis* (Ev.). One can judge that this species prefers habitats other than screes, as it has been found in the Pieniny Mts. in all types of habitats except screes.

4. A phenological and biological characteristic of the genus *Prosopis* Jur. in the Pieniny Mts.

Members of the genus *Prosopis* Jur. are on the wing in the Pieniny Mts. from June. The time of the appearance of specimens of both sexes is shown in table III. The first half of each month is marked 1, and the second is marked 2.

Table III

No.	Species	VI		VII		VIII		IX	
		1	2	1	2	1	2	1	2
1.	*Prosopis confusa* (Nyl.)	♂	♂♀	♂♀	♀	♂♀	♀	♀	
2.	*Prosopis brevicornis* (Nyl.)		♂	♂		♂♀	♀		
3.	*Prosopis sinuata* Schenck		♂			♀			
4.	*Prosopis communis* (Nyl.)		♂	♂♀	♀	♀	♀		
5.	*Prosopis nigrita* (Fabr.)			♂	♂♀	♂♀			
6.	*Prosopis difformis* Ev.			♂	♂	♀	♀		
7.	*Prosopis hyalinata* (Sm.)	♂	♂♀	♂♀	♀	♂♀			

P. confusa (Nyl.) and *P. hyalinata* (Nyl.) have been found as the earliest species on the wing in the Pieniny Mts.; males have been collected in the first half of June and females in the second half. Few males have been collected again in the first days of August. *P. brevicornis* (Nyl.) has been observed from the second half of June, and both sexes have been found again at the beginning of August. According to Stoeckhert (1932) *P. confusa* (Nyl.) and *P. hyalinata* (Sm.) have two generations a year in southern Europe. According to the data shown in table III one can judge that in the Pieniny Mts. the two species also have two generations a year. The males appear on the wing earlier than the females and they are active for about one month. The females appear about two weeks after the males are on the wing. In the second half of June the males of *P. sinuata* Schenck and *P. communis* (Nyl.) also appear. Most of the species of the genus under consideration are on the wing in the second half of June and continue to fly until July and August. The activity of the discussed species is over by late August. The females are active one moth longer than the males and their period of activity lasts for about six weeks.

The representatives of the genus *Prosopis* Jur. have been found to visit only a few species of flowering plants, mostly *Sedum* L. and *Leonthodon* L. *P. confusa* (Nyl.) has been found to visit *Campanula* L. and *Leonthodon* L. and *P. nigrita* (Fabr.) only *Anthemis tinctoria* L.

III. ZOOGEOGRAPHIC AND ECOLOGICAL ANALYSIS OF THE SPECIES OF THE FAMILY *ANDRENIDAE* OF THE PIENINY MTS.

1. A comparison of the species of the family *Andrenidae* of the Pieniny Mts. with the fauna of this family of Poland

The distribution of the species of the family *Andrenidae* occurring in Poland is shown in table IV. The accepted division of Poland is like that discussed previously. The occurrence of the individual species in the regions I—VI is marked with +, and probable occurrence with?

Of ninety-four species of the genus *Andrena* F. known from Poland forty species have been found in the Pieniny Mts. Of these, two species, namely *A. agilissima* (Scop.) and *A. haemorrhoidalis* (Fabr.) were recorded by Sitowski (1910), Kuntze (1934) and Wierzejski (1868). Wierzejski found *A. haemorrhoidalis* (Fabr.) also in the Tatra Mts. Other thirty-nine species are new to the fauna of the Pieniny Mts., and eight are new to the Polish Carpathians. One of the species new to the Polish Carpathians was found also at the foot of the Tatra Mts. in Czechoslovakia (Svábovice — Moscáry, 1918). Seven species found in the Pieniny Mts. were reported from the Polish Carpathians but not from the Tatra Mts., these are:

A. thoracica (Fabr.) recorded from Nowy Targ by Śnieżek, 1910,

A. nigroaenea (K.) recorded from Mszana Dolna and Poręba Wielka by Śnieżek, 1910,

A. bicolor Fabr. recorded from Gubałówka by Noskiewicz, 1920,

A. minutula (K.) recorded from Zakopane by Śnieżek, 1910,

A. hattorfiana (Fabr.) recorded from Mszana Dolna and Nowy Targ by Śnieżek, 1910, as well as from Svábovice at the foot of the Czechoslovakian Tatra Mts., by Moscáry, 1918,

A. denticulata (K.) recorded from Mszana Dolna by Śnieżek, 1910, and from Svábovice at the foot of the Czechoslovakian Tatra Mts., by Moscáry, 1918,

A. combinata (Christ.) recorded from Poręba Wielka, by Śnieżek, 1910.

Eight species of the genus *Andrena* Fabr. were found in the Tatra Mts. Four of these, namely, *A. haemorrhoa* (Fabr.), *A. humilis* Imhoff, *A. fucata* Sm. and *A. coitana* (K.) are probably distributed throughout Poland. *A. subopaca* Nyl. was found in the whole region except Central Poland. The remaining species, known from the Tatra Mts., have not as yet been found in the Pieniny Mts. These are:

A. nudigastra Alfken, found by Noskiewicz in Kuźnice (new to Poland fauna),

A. lapponica Zett., occurring in the subalpine and alpine zones in the Tatra Mts. (Noskiewicz, 1920, Dylewska, 1958), moreover found on Babia Góra (leg. Pawłowski),

Table IV

No.	Species	I	II	III	IV	V	VI
1.	*Andrena morio* BRULLÉ				+	+	+
2.	*Andrena nasuta* GIR.				+	+	+
3.	*Andrena carbonaria* (L.)			+	+	+	+
4.	*Andrena nigrospina* THOMS.					+	
5.	*Andrena cineraria* (L.)			+	+	+	+
6.	*Andrena barbaraeae* PZ.				+	+	+
7.	*Andrena agilissima* (SCOP.)	+			+		
8.	*Andrena vaga* PZ.	+		?	+	+	+
9.	*Andrena thoracica* (FABR.)	+		+	+	+	+
10.	*Andrena assimilis* RAD.				+	+	
11.	*Andrena pubescens* OLIV.	+			+	+	+
12.	*Andrena limata* SM.					+	
13.	*Andrena tibialis* (K.)	+			+	+	+
14.	*Andrena haemorrhoa* (FABR.)	+	+	+	+	+	+
15.	*Andrena morawitzi* THOMS.				+	+	+
16.	*Andrena bimaculata* (K.)				+	+	+
17.	*Andrena blüthgeni* STOECK.						+
18.	*Andrena nigroaenea* (K.)	+		+	+	+	+
19.	*Andrena suerinensis* FRIESE				+	+	+
20.	*Andrena fulvago* (CHRIST)	+		?	+	+	+
21.	*Andrena polita* SM.					+	
22.	*Andrena humilis* IMHOFF	+	+	+	+	+	+
23.	*Andrena nudigastra* ALFKEN		+				
24.	*Andrena taraxaci* GIR.	+		+	+		
25.	*Andrena bicolor* FABR.	+	?	+	+	+	+
26.	*Andrena fulvida* SCHENCK				+	+	+
27.	*Andrena symphyti* SCHENCK				+	+	
28.	*Andrena ruficrus* NYL.				+	+	+
29.	*Andrena varians* (K.)				+	+	+
30.	*Andrena helvola* (L.)	+		?	+	+	+
31.	*Andrena lapponica* ZETT.		+	+	+	+	+
32.	*Andrena praecox* (SCOP.)	+	?	?	+	+	+
33.	*Andrena apicata* SM.				+	+	+
34.	*Andrena bavata* PÉR.					+	+
35.	*Andrena mitis* SCHMDK.				+	+	
36.	*Andrena fucata* SM.	+	+	?	+	+	+
37.	*Andrena armata* GMEL.				+	+	+
38.	*Andrena clarkella* (K.)	+	?	?	+	+	+
39.	*Andrena nycthemera* IMHOFF	+		?	+	+	+
40.	*Andrena nana* (K.)	+		?	+	+	+
41.	*Andrena floricola* EV.	+		?	+	+	+
42.	*Andrena niveata* FRIESE				+	+	+
43.	*Andrena alfkenella* PERK.	+		?	+	+	+
44.	*Andrena subopaca* NYL.	+	+	?	+		+
45.	*Andrena falsifica* PERK.						+
46.	*Andrena saundersella* PERK.				+		+
47.	*Andrena minutula* (K.)	+		+	+	+	+
48.	*Andrena minutuloides* PERK.	+		?	+	+	+

No.	Species	I	II	III	IV	V	VI
49.	*Andrena nanula* Nyl.				+	+	+
50.	*Andrena labiata* Fabr.				+	+	+
51.	*Andrena potentillae* Pz.				+	+	+
52.	*Andrena viridescens* Vier.				+	+	?
53.	*Andrena marginata* Fabr.	+		?	+	+	+
54.	*Andrena ventralis* Imhoff	+		?	+	+	+
55.	*Andrena sericata* Imhoff				+		
56.	*Andrena hattorfiana* (Fabr.)	+		+	+	+	+
57.	*Andrena florea* Fabr.				+	+	+
58.	*Andrena jakobi* Perk.	+		?	+	+	+
59.	*Andrena rosae* Pz.			+	+	+	+
60.	*Andrena curvungula* Thoms.	+		?	+	+	?
61.	*Andrena pandellei* Saund.				+		
62.	*Andrena paucisquama* Nosk.	+				+	
63.	*Andrena rufizona* Imhoff		+				
64.	*Andrena labialis* (K.)	+			+	+	+
65.	*Andrena schencki* Mor.			+	+	+	
66.	*Andrena decipiens* Schenck				+		+
67.	*Andrena flavipes* Pz.			+	+	+	+
68.	*Andrena gravida* Imhoff				+	+	+
69.	*Andrena chrysopyga* Schenck				+	+	+
70.	*Andrena nigriceps* (K.)		+	+	+	+	+
71.	*Andrena bremensis* Alfken					+	+
72.	*Andrena simillima* Sm.				+		+
73.	*Andrena fuscipes* (K.)			+	+	+	+
74.	*Andrena denticulata* (K.)	+		+	+	+	+
75.	*Andrena nitidiuscula* Schenck			+	+	+	+
76.	*Andrena fulvicornis* Schenck				+	+	
77.	*Andrena chrysosteles* (K.)				+	+	+
78.	*Andrena coitana* (K.)	+	+	+	+	+	+
79.	*Andrena tarsata* Nyl.			+	+	+	+
80.	*Andrena barbilabris* (K.)	+		?	+	+	+
81.	*Andrena argentata* Sm.				+	+	+
82.	*Andrena proxima* (K.)	+		?	+	+	+
83.	*Andrena propinqua* Schenck	+		?	+	+	+
84.	*Andrena dorsata* (K.)	+		?	+	+	+
85.	*Andrena congruens* Schmdk.				+		
86.	*Andrena combinata* (Christ.)	+		+	+	+	+
87.	*Andrena separanda* Schmdk.					+	+
88.	*Andrena ovatula* (K.)			+	+	+	+
89.	*Andrena albofasciata* Thoms.	+			+	+	+
90.	*Andrena wilkella* (K.)	+			+	+	+
91.	*Andrena similis* Sm.					+	+
92.	*Andrena lathyri* Alfken				+		+
93.	*Andrena ratisbonensis* Stoeckh.	+					
94.	*Andrena synadelpha* Perk.				+		

A. rufizona IMHOFF, reported from Toporowa Cyrhla by NOSKIEWICZ, 1920,

A. nigriceps (K.), found by NOSKIEWICZ, 1920, in Toporowa Cyrhla, moreover reported from Żegiestów and Nowy Targ, by ŚNIEŻEK, 1910.

Of the above mentioned four species, *A. nigriceps* (K.) may occur in the Pieniny Mts., *A. nudigastra* ALFKEN is a little known species, *A. rufizona* IMHOFF is an alpine element in the Polish fauna and *A. lapponica* ZETT. visits only *Vaccinium myrthillus* L. which is absent from the flora of the Pieniny Mts. Many species reported from the Polish Carpathians (mostly by ŚNIEŻEK, in 1910) have not as yet been found in the Pieniny Mts., these are:

A. carbonaria L., found in Chabówka and Mszana Dolna,

A. cineraria (L.) reported from Zakopane and Nowy Targ,

A. rosae Pz., reported from Chabówka and Nowy Targ,

A. schencki MOR., reported from Rabka and Mszana Dolna,

A. fuscipes (K.), found in Mszana Dolna,

A. nitiduscula SCHENCK, reported from Żegiestów,

A. tarsata NYL., reported from Zakopane and Krynica (NOSKIEWICZ, 1956), and

A. ovatula (K.) recorded from Mszana Dolna.

Forty-five species found in the Polish Carpathians are probably distributed throughout Poland. Moreover, at least nineteen species are known from all the discussed regions of Poland except for the Polish Carpathians. Some of them are expected to be found in the Polish Carpathians. Of these, *A. gravida* IMHOFF has recently been found in Silesia by NOSKIEWICZ, and *A. nanula* FABR. has been found in Kazimierz by the Vistula River also by NOSKIEWICZ. These records are new to the respective regions of Poland. — Other species of the genus *Andrena* FABR. were recorded only from a few localities in Poland. Thus, in Central Poland are found *A. nigrospina* THOMS., *A. limbata* SM., *A. polita* SM., *A. ratsibonensis* STOECKH. (Winna Góra ad Przemyśl, at the foot of the Polish Carpathians); then, from Northern Poland were recorded *A. blüthgeni* STOECKH. and *A. falsifica* PERK. Then, *A. synadelpha* PERK. (a western species), *A. sericata* IMHOFF, *A. pandelaei* SAUND. and *A. congruens* SCHMDK. were found only in Silesia. *A. symphyti* SCHMDK. had previously been reported only from Silesia, but it has recently been found in Sandomierz, Central Poland, by NOSKIEWICZ. *A. mitis* SCHMDK. and *A. fulviventris* SCHENCK are also known from Silesia and Central Poland. From Northern and Central Poland are known *A. armata* (GMEL.), *A. bavata* PÉR., *A. bremensis* ALFKEN, *A. separanda* SCHMDK. and *A. similis* SM. Then, *A. saundersella* PERK (found by NOSKIEWICZ in Silesia), *A. decipiens* SCHENCK, found in the DITTRICH collection (specimens from Silesia, det. NOSKIEWICZ), *A. similis* SM. and *A. lathyri* ALFKEN, are known only from Silesia and Northern Poland.

The genera of the family *Andrenidae* known from Poland (other than *Andrena* FABR.) are as follows: *Melitturga* LATR., *Panurgus* Pz. and *Panurginus* NYL. The distribution of the members of these genera in Poland is shown in table V.

Table V

No.	Species	I	II	III	IV	V	VI
1.	*Melitturga clavicornis* (LATR.)					+	+
2.	*Panurgus banksianus* (K.)		+	+	+		+
3.	*Panurgus calcaratus* (SCOP.)	+	+	+	+	+	+
4.	*Panurginus labiatus* EV.			+	+	+	

In the Pieniny Mts. only *Panurgus calcaratus* (SCOP.) was found. Previously this species was recorded from other ranges of the Polish Carpathians; WIERZEJSKI (1868) reported it from the Tatra Mts., ŚNIEŻEK (1910) from Poręba Wielka and NOSKIEWICZ (1920) from Gubałówka. It is of interest to note that *Panurgus banksianus* (K.) has not been found in the Pieniny Mts. It is known from the Tatra Mts. (WIERZEJSKI, 1868), Zakopane, Poręba Wielka (ŚNIEŻEK, 1910) and Gubałówka (NOSKIEWICZ, 1920). The absence of this species in the Pieniny Mts. is rather difficult to explain, as in that region there are suitable conditions for nesting and the flowers which are visited by the species grow there. *Panurgus calcaratus* (SCOP.) is distributed throughout Poland, and *Panurgus banksianus* (K.), a Boreal-Alpine species, has not as yet been found in Central Poland. *Panurgus labiatus* EV. is known from the Subcarpathian Region (Przemyśl) and from south-eastern Central Poland (Jarosław, Przeworsk, leg. NOSKIEWICZ and PUŁAWSKI), moreover, it was reported from Silesia, Przemyśl and Central Poland. *Melitturga clavicornis* (LATR.) was reported from Białystok and from the Kraków region (NOSKIEWICZ, 1938).

2. A zoogeographic analysis and the origin of the *Andrenidae* species found in the Pieniny Mts.

The members of the genus *Andrena* FABR. found in the Pieniny Mts., belong to the groups of species which are widely distributed in Europe and Asia. Thus, in Europe and in the Palaearctic regions of Asia the following species occur: *A. tibialis* (K.), *A. humilis* IMHOFF, *A. labialis* (K.) and *A. barbilabris* (K.). The species found in Europe and in North Africa are: *A. thoracica* (FABR.), *A. nigroaenea* K., *A. bicolor* (FABR.) and *A. hattorfiana* (FABR.). The following species are spraed throughout Europe: *A. pubescens* OLIV., *A. floricola* EV., *A. denticulata* (K.), *A. proxima* K., *A. dorsata* K., *A. albofasciata* THOMS., *A. wilkella* (K.) and *Panurgus calcaratus* (SCOP.). In whole of Europe except for Great Britain and Northern Germany is known *Andrena floricola* EV. From Northern and Central Europe were recorded the following species: *Andrena vaga* PZ., *A. haemorrhoa* (FABR.), *A. fulvago* (CHRIST), *A. helvola* (L.), *A. fucata* SM., *A. clarkella* (K.), *A. subopaca* NYL., *A. sandersella* PERK., *A. minuta* K., *A. minutuloides* PERK., *A. jakobi* PERK., *A. coitana* (K.), and *A. tarsata* NYL.

Of these, *A. tarsata* (Nyl.), and likely *A. coitana* (K.) belong to the Boreal-Alpine group of species. Two species are known only from Central Europe, these are: *Andrena nycthemera* Imhoff and *A. curvungula* Thoms. From Central and Western Europe one species was recorded namely, *Andrena alfkenella* Perk. From South and Central Europe six species were reported namely, *Andrena labiata* Fabr., *A. marginata* Fabr., *A. ventralis* Imhoff, *A. propinqua* Schenck, *A. combinata* (Christ) and *A. nana* (K.).

Two groups of xerothermophil species can be distinguished:

1. Southern species, found in Poland in the Carpathians in the Pieniny Mts., as well as in the Przemyśl region and Silesia; these are: *Andrena agilissima* (Scop.) and *A. taraxaci* Gir.

2. South-eastern species, namely, *A. paucisquama* Nosk., which in addition to the Pieniny Mts., was found in Poland in the Kraków region and in the Pieprzowe Mts. (near Sandomierz) (Noskiewicz, 1957). This species is monophagous being confined to *Campanula sibirica* L.

The above mentioned xerothermophil species, being known only from a few localities in Central Poland, are the outstanding element of the *Andrenidae* fauna in the Pieniny Mts. It is of much interest here to discuss the first three of these species. The nearest localities outside of Poland, in which these species were found, are in Podolia (Noskiewicz, 1938). Moreover, *Andrena agilissima* (Scop.) was found in Moravia and in the Prague-region, and *A. taraxaci* Gir. is known from Moravia, Hungary and Austria. The third species, namely, *A. paucisquama* Nosk. was recorded from several localities outside of Poland, namely, from Podolia, the Kiev region and Hungary. Because of such inadequate data on the occurrence of these species, it is difficult to state their origin in the Pieniny Mts. They may have reached the Pieniny Mts. via Slovakia, as is supposed with regard to *Osmia andrenoides* Spin. (Dylewska, 1962), or via another route.

The occurrence of other species under consideration in the Pieniny Mts. is easy to explain, as they belong to the Central European fauna. The absence of the mountain species from the fauna of the Pieniny Mts. is rather peculiar. Judging by the study of the *Megachilidae* and *Apidae* of the Pieniny Mts. (Dylewska, 1962), we know that there are no high-alpine species in the region under consideration, however, there are some mountain or Boreal-Alpine species, such as *Bombus mastrucatus* Gerst. It is of interest to note that the Pieniny Mts. are rich in lowand species, this is evident after the discovery in that region of twenty-eight species new to the Polish Carpathians.

4. The *Andrenidae* in the habitats of the Pieniny Mts.

The occurrence of the members of the family *Andrenidae* in the individual habitats of the Pieniny Mts. is shown in table VI. The habitats are marked I—VIII, and this is explained above. The presence of the species in the individual habitats is marked with a +.

Table VI

No.	Species	I	II	III	IV	V	VI	VII	VIII
1.	*Andrena agilissima* (SCOP.)				+		+	+	+
2.	*Andrena vaga* PZ.						+		
3.	*Andrena thoracica* (FABR.)						+		+
4.	*Andrena pubescens* OLIV.		+		+	+	+	+	+
5.	*Andrena tibialis* (K.)					+	+		+
6.	*Andrena haemorrhoa* (FABR.)		+		+	+	+	+	+
7.	*Andrena nigroaenea* (K.)			+			+	+	
8.	*Andrena fulvago* (CHRIST)		+		+	+			+
9.	*Andrena humilis* IMHOFF					+			+
10.	*Andrena taraxaci* GIR.		+			+		+	+
11.	*Andrena bicolor* FABR.		+		+	+	+		+
12.	*Andrena helvola* (L.)								+
13.	*Andrena praecox* (SCOP.)		+	+		+	+	+	+
14.	*Andrena fucata* SM.			+	+	+	+		+
15.	*Andrena clarkella* (K.)		+	+		+			+
16.	*Andrena nycthemera* IMHOFF					+	+		+
17.	*Andrena nana* (K.)				+	+			
18.	*Andrena floricola* EV.					+			+
19.	*Andrena alfkenella* PERK.			+	+	+	+	+	+
20.	*Andrena subopaca* NYL.					+	+		+
21.	*Andrena minutula* (K.)					+	+		+
22.	*Andrena minutuloides* PERK.			+		+	+		+
23.	*Andrena labiata* FABR.					+	+		
24.	*Andrena marginata* FABR.					+	+		
25.	*Andrena ventralis* IMHOFF					+			+
26.	*Andrena hattorfiana* (FABR.)					+	+	+	+
27.	*Andrena jakobi* PERK.		+			+			+
28.	*Andrena curvungula* THOMS.						+		
29.	*Andrena paucisquama* NOSK.							+	
30.	*Andrena labialis* (K.)						+		
31.	*Andrena denticulata* (K.)					+	+		+
32.	*Andrena coitana* (K.)		+	+		+	+		
33.	*Andrena barbilabris* (K.)						+		+
34.	*Andrena proxima* (K.)					+	+		+
35.	*Andrena propinqua* SCHENCK					+	+		+
36.	*Andrena dorsata* (K.)				+	+			
37.	*Andrena combinata* (CHRIST)				+		+		+
38.	*Andrena albofasciata* THOMS.					+			+
39.	*Andrena wilkella* (K.)				+	+	+		
40.	*Panurgus calcaratus* (SCOP.)					+	+	+	

Of forty species of the *Andrenidae* found in the Pieniny Mts. only nine species have been observed on the northern slopes (habitats I and II); these species have been found only in meadows (habitat II): *Andrena pubescens baltica* ALFKEN, *A. haemorrhoa* (FABR.), *A. fulvago* (CHRIST.), *A. taraxaci* GIR., *A. bicolor* FABR., *A. praecox* (SCOP.), *A. clarkella* (K.), *A. jakobi* PERK. and *A. coitana* (K.).

It is of interest to note that the moist and thick woods of the northern slopes lack any species of the *Andrenidae*. The above mentioned species have been collected mostly in Spring and mainly on flowering sallows, and some on *Taraxacum officinale* L. In the summer in spite of a thorough study of the northern slopes, only a few specimens of *Andrena haemorrhoa* (FABR.) and *A. fulvago* (CHRIST.) have been found. The poor fauna of the *Andrenidae* on the northern slopes of the Pieniny Mts. is peculiar, as these slopes shows a rich flora.

However, the climate of only higher parts of the northern slopes of the Pieniny Mts. resembles that of the lower region of the Tatra Mts. (region montana inferior). This is due to the altitude of both areas (the highest peak of the Pieniny Mts., Trzy Korony — 982 m. alt.), considerably moist and not steep northern slopes of the Pieniny Mts. and their exposure to wind. Because of these circumstances the fauna of the northern slopes of the Pieniny Mts. includes some species common to the lower region of the Tatra Mts. (DYLEWSKA, 1962). If we would not take into consideration species collected in the lowest part of the Pieniny Mts. (Krościenko region which is entered by the species preferring the wormest habitats in the Pieniny Mts.), namely, *A. fulvago* (CHRIST) and *A. taraxaci* GIR., it will be received a cluster of species which can live in the Tatra Mts. Of these, only *A. haemorrhoa* (FABR.) has as yet been found in the Tatra Mts., and the others not, most probably due to the fact that the study of the Tatra Mts., had been made mainly in the summer while the species occurring on the northern slopes of the Pieniny Mts. are, in most cases, on the wing in spring. On the other hand, several species of the *Andrenidae* occurring in the Tatra Mts. have not as yet been found on the nothern slopes of the Pieniny Mts. These are: *Andrena humilis* IMHOFF, *A. fucata* SM., *A. subopaca* NYL. and *Panurgus calcaratus* (SCOP.). The number of species of the *Andrenidae* appearing on the southern slopes of the Pieniny Mts. is large and each species is abundant in specimens as well. Most species appears mainly in meadows (habitat V) and in screes and rocks (habitat VI). A fewer number of species have been found in the glades of the Trzy Korony massif (habitat IV), where eleven species have been observed. Then species have been found in the fields and meadows of Sromowce which are situated at the foot of the southern slopes. Only seven species have been collected in the well insolated woods of the southern slopes. The Pieniny Mts. show especially a large number of species which are on the wing in the spring and visit mainly *Salix* L. and *Taraxacum officinale* L. These are: *Andrena agilissima* (SCOP.), *A. pubescens baltica* ALFKEN, *A. haemorrhoa* (FABR.), *A. humilis* IMHOFF, *A. taraxaci* GIR., *A. nycthemera* IMHOFF, *A. alfkenella* PERK., *A. subopaca* NYL., *A. minutula* (K.) and *A. ventralis* IMHOFF. Of summer species, very common is *Andrena hattorfiana* (FABR.) which visits flowering *Knautia* L. and *Scabiosa* L. In the summer there appears also a good number of the *Andrenidae*, which visit many plants which are in flower in that time, (as *Campanula* L., *Fragaria* L., *Thymus* L., *Geranium* L., and *Lenothodon* L.). These plants flower in most of the distinguished habitats of the southern slopes of the Pieniny Mts.

Only a few species have not been found in the screes (habitat VI); some of these visit *Taraxacum officinale* L. and are to be found mainly in the meadows: *Andrena humilis* Imhoff, *A. taraxaci* Gir., and *A. fulvago* (Christ). Also *Andrena jakobi* Perk. has been found in the meadows (mainly on *Salix* L.) and on the side of the Dunajec River (habitat VIII). *Andrena ventralis* Imhoff appears in the Pieniny Mts. also on *Salix* L. (by the Dunajec River and in other habitats close to that river). Other species not found in the habitat VI, have been observed in a few localities in one or a few specimens.

The river side osiers growing by the Dunajec River (habitat VIII) are also very rich is species of the family *Andrenidae*. In this habitat twenty-seven species have been found. Some of these species have also been found in the immediate vicinity, in screes and rocks of the Grabczycha, in the meadows and fields of Sromowce, in the Czorsztyn region (habitat V) and in the meadows of the northern slopes near Krościenko as well. These species are as follows: *Andrena helvola* (L.), *A. clarkella* (K.), *A. ventralis* Imhoff, *A. curvungula* Thoms., *A. paucisquama* Noskiewicz, *A. labialis* (K.), *A. denticulata* (K.) and *A. barbilabris* (K.). Also a very rich fauna of the *Andrenidae* occurs on the rocks, screes and meadows of the southern slopes (habitat V and VI) west of Sobczański Glen (Podskalnia Góra, Kotłowe Skały, Nowa Góra, Rabsztyn, Zamczysko and others) excluding, however, the top rocky parts of the Pieniny Mts. The number of species found in this western part of the Pieniny Mts. (but not in habitat VIII and its immediate vicinity) is sixteen. The next group of species includes those found in all above mentioned regions (habitat VIII and west part of the Pieniny Mts.), as well as in the warm glades protected by wood of the Trzy Korony massif (habitat IV). The remaining species have been found in the above mentioned regions, as well as in the rocky zone and top zone of the northern slopes.

4. The phenological observations on the family *Andrenidae* in the Pieniny Mts.

According of the phenological data on the family *Andrenidae* in the Pieniny Mts., two groups of species can be distinguished. The first of them comprises the species which are on the wing in early spring, mainly in April and May and which visit flowering willows and *Taraxacum* L. The other group contains the species appearing in the summer and, in the Pieniny Mts., they are observed mainly in the second half of June. Among the species of the first group can be distinguished those which are on the wing exclusively in the spring and those also having second (summer) generation. The spring species and their time of appearance (with marked half of the months) are shown in table VII

Eleven species shown in table VI are on the wing only in the spring. The species appearing in April have also been found in May, and those appearing

Table VII

No.	Species	IV		V		VI	
		1	2	1	2	1	2
1.	*Andrena agilissima* (Scop.)			♂♀	♂♀	♀	♀
2.	*Andrena thoracica* (Fabr.)	♀	♀	♂♀			
3.	*Andrena tibialis* (K.)		♂	♂♀			
4.	*Andrena humilis* Imhoff			♂	♂♀	♂	♂♀
5.	*Andrena taraxaci* Gir.	♂	♂♀	♀	♀		
6.	*Andrena helvola* (L.)			♂			
7.	*Andrena praecox* (Scop.)	♂♀	♂♀	♂♀	♀		
8.	*Andrena clarkella* (K.)		♀	♀	♂♀		
9.	*Andrena nycthemera* Imhoff		♀	♀	♂♀		
10.	*Andrena ventralis* Imhoff	♂	♂♀	♂♀			
11.	*Andrena jakobi* Perk.	♂	♂♀	♂	♀		
12.	*Andrena proxima* (K.)				♂	♂	♂

in May are still on the wing in June. No species shown in table VI has been found in July. It has been observed in the common species, as *Andrena taraxaci* Gir. or *A. ventralis* Imhoff, that the males are on the wing about fourteen days earlier than the females. The females are on the wing for about four weeks after the males are over. The time of the active life of males lasts for about three weeks, that of the females three to four weeks. Most interesting species in the Pieniny Mts. are xerothermophilous *Andrena agilissima* (Scop.) and *A. taraxaci* Gir. (The former is on the wing from early May (judging by the appearance of males of other species, the males of *A. agilissima* (Scop.) may appear even in late April), and the females appear in about mid-May; males are on the wing till late May and females till late June; the latter species has been observed in first half of April on flowering *Tussilago farfara* (L.) (males); and females of this species are on the wing in the second half of April, also on *Tussilago farfara* L., whilst in May the specimens of this species visit only *Taraxacum officinale* L. A close species *A. humilis* Imhoff appears from May until the end of June. In late May most of the species shown in table VI are over.

The time of the appearance of species which appear in the spring and are still on the wing in the summer is shown in table VIII (marked as table VII).

Judging by the time of the appearance of the species shown in table VIII, there are sixteen species of the genus *Andrena* Fabr. which have two generations a year in the Pieniny Mts. Most of these species are on the wing from April. The males of the first generation die in most cases in late May; fresh males have been collected again in second half of June, and these males are normally on the wing until mid-July. The females of the first generation are generally on the wing in May, and those of the second generation in July and August. The males of some species, as *Andrena nana* (K.) or *A. minutula* (K.) and *A. labiata* Fabr. have been found even in the first half of August. The

Table VIII

No.	Species	IV		V		VI		VII		VIII	
		1	2	1	2	1	2	1	2	1	2
1.	*Andrena vaga* Pz.							♀			
2.	*Andrena pubescens baltica* ALFKEN	♂♀	♂♀	♂♀	♀			♀			
3.	*Andrena haemorrhoa* (FABR.)	♂♀	♂♀	♂♀	♀		♂		♀		
4.	*Andrena nigroaenea* (K.)					♂	♂♀				
5.	*Andrena fulvago* (CHRIST)		♂♀		♂♀						
6.	*Andrena bicolor* FABR.	♂♀	♂♀	♂♀	♀		♂♀	♂♀	♀	♀	♀
7.	*Andrena fucata* SM.			♀	♀		♂♀	♀	♀		
8.	*Andrena nana* (K.)								♀	♂	
9.	*Andrena floricola* EV.			♀						♀	
10.	*Andrena alfkenella* PERK.	♂♀		♂♀	♂♀	♂♀	♂				
11.	*Andrena subopaca* NYL.			♀	♀	♂♀				♀	
12.	*Andrena minutula* (K.)	♀	♀	♀	♂♀		♀	♂		♀	
13.	*Andrena minutuloides* PERK.	♀		♀	♂♀	♀	♀	♀		♂♀	♀
14.	*Andrena labiata* FABR.			♀	♀			♂		♂	
15.	*Andrena propinqua* SCHENCK	♂	♀	♀	♀		♀		♀	♀	
16.	*Andrena combinata* (CHRIST)				♂♀		♀				♀

second generation, however, has been observed not often and therefore it is unlikely that the specimens collected in August belong to the third generation. In second generation the most abundant species is *A. bicolor* FABR., the males of which are on the wing earlier than the females. There are no data on the appearance of the males of *A. fucata* SM., *A. minutula* (K.) and *A. minutuloides* PERK., in the spring, however, these species are very scarce in that time. STOECKHERT (1932) mentioned that *A. subopaca* NYL. is a species which has one generation a year. However, we place this in table as a doublebrooded species, as a male was found in the first half of June and a female in the first half of August. *A. nana* (K.) is also considered here to be a species having two generations a year, in spite of the fact that it was found in the Pieniny Mts. only in the second half of July and the first half of August. However, it belongs to a group of species which, in other regions, has two generations a year.

The time of appearance of summer species in the Pieniny Mts. is shown in table IX. These species have been observed during the early part of June, when only males were collected while females were collected from the middle of June. The species which occur on the wing in June continue to fly until the middle of August, and those which were observed in July are on the wing until end of August. The time of their appearance coincides with the flowering of their food-plants. Thus, *A. marginata* FABR. and *A. hattorfiana* (FABR.) appear when *Knautia* L. and *Scabiosa* L. are in flower.

In the Pieniny Mts. the summer species probably have only one generation a year, excepting, perhaps, *Panurgus calcaratus* (Scop.) which probably has two generations a year, one in late June and early July and the other in August.

A comparison of the data in tables VII, VIII and IX shows that the group most abundant in species in the Pieniny Mts. is that which comprises the double brooded species. The fact that in some species of the genus *Andrena* Fabr. a second generation occurs in the Pieniny Mts. is due to favourable climatic conditions.

Table IX

No.	Species	VI		VII		VIII	
		1	2	1	2	1	2
1.	*Andrena marginata* Fabr.			♂♀		♀	
2.	*Andrena hattorfiana* (Fabr.)	♂♀	♂♀	♀		♀	
3.	*Andrena curvungula* Thoms.		♀				
4.	*Andrena paucisquama* Nosk.		♀				
5.	*Andrena labialis* (K.)		♂				
6.	*Andrena denticulata* (K.)			♀	♂♀	♀	♀
7.	*Andrena coitana* (K.)			♀		♀	♀
8.	*Andrena dorsata* (K.)			♀		♀	♀
9.	*Andrena albofasciata* Thoms.		♂				
10.	*Andrena wilkella* (K.)		♀	♀	♀	♀	
11.	*Panurgus calcaratus* (Scop.)		♀	♀		♀	♀

IV. ZOOGEOGRAPHIC AND ECOLOGICAL CHARACTERISTICS OF THE SPECIES OF THE FAMILY *HALICTIDAE* OCCURRING IN THE PIENINY MTS.

1. A comparison of the *Halictidae* of the Pieniny Mts. with the fauna of this family in Poland

The distribution of the species of the family *Halictidae* in Poland is shown in table X. The accepted division of Poland (I—VI) is as that given for *Andrenidae*. The presence of the individual species in the distinguished regions of Poland is marked with +, and the probable occurrence with?

Sixty-three species of the *Halictidae* have been found in Poland. Of these, twelve species have been collected in the Polish Carpathians. The species recorded by Wierzejski (1868) from the Pieniny Mts., namely, *Halictus minutus* (K.) and *H. malachurus* (K.) are not placed in table X, because of the lack of the respective specimens in the collection of Wierzejski. The subsequent study of the Pieniny Mts. did not confirm his record. Twenty species

Table X

No.	Species	I	II	III	IV	V	VI
1.	*Halictus quadrinotus* (Fabr.)			+	+	+	+
2.	*Halictus rubicundus* (Christ)	+		+	+	+	+
3.	*Halictus sexcinctus* (Fabr.)			?	+	+	+
4.	*Halictus eurygnatus* Blüthgen			+	+	+	+
5.	*Halictus simplex* Blüthgen	+		?			+
6.	*Halictus maculatus* Sm.	+		+	+	+	+
7.	*Halictus subauratus* (Rossi)			?	+	+	+
8.	*Halictus tumulorum* (L.)	+		+	+	+	+
9.	*Halictus perkinsi* Blüthgen			?	+	+	+
10.	*Halictus semitectus* Mor.			?	+		+
11.	*Halictus fasciatus* Nyl.			?	+	+	+
12.	*Halictus xanthopus* (K.)			?	+	+	+
13.	*Halictus subfasciatus* (Imhoff)			?	+	+	+
14.	*Halictus prasinus haemorrhoidalis* (Schenck)			?	+	+	+
15.	*Halictus nitidus* (Pz.)	+		+	+	+	+
16.	*Halictus sexmaculatus* (Schenck)					+	+
17.	*Halictus sexnotatulus* Nyl.						+
18.	*Halictus breviventris* (Schenck)				+		
19.	*Halictus quadrinotatus* (K.)	+			+	+	+
20.	*Halictus lativentris* (Schenck)	+				+	+
21.	*Halictus quadrinotatulus* (Schenck)			?	+	+	+
22.	*Halictus laevigatus* (K.)			?	+	+	+
23.	*Halictus zonulus* Sm.			?	+	+	+
24.	*Halictus major* Nyl.			?	+	+	+
25.	*Halictus costulatus* Kriechb.			?	+	+	+
26.	*Halictus leucozonius* (Schrank)	+		+	+	+	+
27.	*Halictus interruptus* (Pz.)			?	+	+	+
28.	*Halictus pygmaeus* (Schenck)					+	?
29.	*Halictus villosus* (K.)	+	+	+	+	+	+
30.	*Halictus leucopus* (K.)	+		+	+	+	+
31.	*Halictus viridiaeneus* Blüthgen				+	+	+
32.	*Halictus brevicornis* Schenck			?	+	+	+
33.	*Halictus limbellus* Mor.					+	
34.	*Halictus sexstrigatus* Schenck			?	+	+	+
35.	*Halictus tarsatus* Schenck			+	+	+	+
36.	*Halictus intermedius* Schenck	+			?	+	+
37.	*Halictus semilucens* Alfken			?	+	+	+
38.	*Halictus lucidulus* (Schenck)	+			+	+	+
39.	*Halictus minutissimus* (K.)				?	+	+
40.	*Halictus punctatissimus* (Schenck)			?	+	+	+
41.	*Halictus convexiusculus* (Schenck)					+	
42.	*Halictus glabriusculus* Mor.					+	
43.	*Halictus minutus* (K.)			?	+	+	+
44.	*Halictus minutulus* (Schenck)			?	+	+	+
45.	*Halictus rufitarsis* Zett.	+			+	+	+
46.	*Halictus niger* Vier.	+		?	+	+	+

Table X cont.

No.	Species	I	II	III	IV	V	VI
47.	*Halictus fulvicornis* (K.)	+		?	+	+	+
48.	*Halictus setulellus* STRAND					+	
49.	*Halictus laticeps* SCHENCK	+		+	+	+	+
50.	*Halictus pauxillus* (SCHENCK)			?	+	+	+
51.	*Halictus continentalis* BLÜTHGEN				+	+	
52.	*Halictus aeneidorsus* ALFKEN	+		?	+	+	+
53.	*Halictus morio* (FABR.)				+	+	+
54.	*Halictus malachurus* (K.)				+	+	+
55.	*Halictus linearis* SCHENCK			?	+	+	+
56.	*Halictus euboeensis* STRAND					+	+
57.	*Halictus nigripes* LEP.				+	+	
58.	*Halictus calceatus* (SCOP.)	+	+	+	+	+	+
69.	*Halictus albipes* (FABR.)	+	+	+	+	+	+
60.	*Halictus laevis* (K.)	+		?	+	+	+
61.	*Halictus cupromicans* PÉR.		+				
62.	*Halictus politus* (SCHENCK)				+	+	+
63.	*Halictus nitidiusculus* (K.)			?	+	+	+

of the *Halictidae* have been found in the Pieniny Mts. Of these, the following species have previously beon collected in the Polish Carpathians:

Halictus rubicundus (CHRIST.), reported by ŚNIEŻEK (1910) from Poręba Wielka and Nowy Targ,

H. maculatus SM., reported by ŚNIEŻEK (1910) from Poręba Wielka,

H. tumulorum (L.), reported by ŚNIEŻEK (1910) from Poręba Wielka and Zakopane,

H. nitidus (PZ.), reported by ŚNIEŻEK (1910) from Mszana Dolna,

H. leucozonius (SCHRANK), reported by ŚNIEŻEK (1910) from Poręba Wielka and by WIERZEJSKI (1874) from Zakopane.

H. villosulus (K.), reported by NOSKIEWICZ (1920) from Toporowa Cyrhla in the Tatra Mts., from Zakopane by ŚNIEŻEK (1910) and from the Pieniny Mts. by WIERZEJSKI (1874),

H. laticeps SCHENCK, reported from Gubałówka by NOSKIEWICZ (1920),

H. calceatus (SCOP.), reported from the Carpathians by WIERZEJSKI (1874), and from Zakopane by NOSKIEWICZ (1920),

H. albiceps (FABR.), reported from the Tatra Mts. (lower and middle timber zones) by NOSKIEWICZ (1920).

The remaining eleven species found in the Pieniny Mts. are new to the fauna of the Polish Carpathians.

Moreover, the following species have been reported from the Polish Carpathians: *Halictus quadricinctus* (FABR.), from Poręba Wielka and Nowy Targ, by ŚNIEŻEK (1910), *H. eurygnatus* BLÜTHGEN, reported from Gubałówka by NOSKIEWICZ (1920) and *H. cupromicans* PÉR., reported from the Tatra Mts. (lower timber zone) by NOSKIEWICZ (1920).

The number of the species of the genus *Halictus* LATR. found in the Polish Carpathians is twenty-three. However, many other species should be found in the Polish Carpathians, especially those which are widely spraed in Europe and are known throughout Poland except the Polish Carpathians. Such species are marked in the table X with ?. Of the species found in the Pieniny Mts., three have not as yet been found in the Tatra Mts. These are: *H. villosus* (K.), *H. albipes* (FABR.) and *H. calceatus* (SCOP.).

Most of the species found in the Polish Carpathians are distributed throughout Poland with the exception of *Halictus simplex* BLÜTHGEN, *H. lativentris* (SCHENCK) and *H. intermedius* SCHENCK. *H. simplex* BLÜTHGEN has been reported from only North Poland and the Pieniny Mts. The two remaining species have not as yet been found in Silesia and the Sudeten Mts., however, they are expected to occur in these regions. *H. cupromicans* PER., which has been found in the Tatra Mts., is unknown from other regions of Poland. This species belongs to the *H. smeathmanellus* (K.)-group, and its determination is perhaps inaccurate. Possibly it is a species new to science, or is one of the alpine species described by BLÜTHGEN. Most of the remaining species (29) are distributed throughout Poland. Of these, *H. fasciatus* NYL., *H. viridiaeneus* BLÜTHGEN and *H. linearis* SCHENCK were found in Silesia by NOSKIEWICZ. A few other species have been recorded from only a few localitis in Poland. Here belongs *H. sexnotatulus* NYL., which is distributed in north-eastern Europe, and was recorded by STOECKHERT (1954) from Pomerania and the Masovian Lake District. Moreover, some species of southern or south-eastern origin have been found in the xerothermic regions in Poland; these are:

H. semitectus MOR., reported from the Mazurian Lake District, by ALFKEN (1912),

H. breviventris (SCHENCK), reported from Silesia by STOECKHERT (1932) (known in Europe only from few localities),

H. pygmaeus (SCHENCK), reported from Kraków, by ŚNIEŻEK (1910) (uncertain data),

H. limbellus MOR., reported from Opatów Kielecki, by DROGOSZEWSKI (1934) and from Kazimierz on the River Vistula, by MINKIEWICZ (1936),

H. convexiusculus (SCHENCK), reported from Poznań region, by TORKA (1913) and found by NOSKIEWICZ in Sandomierz,

H. glabriusculus (K.), reported from Kraków, by ŁOZIŃSKI (1920), and found by SZYMCZAKOWSKI in Sandomierz,

H. setulellus STRAND, reported from Sandomierz, by NOSKIEWICZ (1952),

H. eubonensis STRAND, reported from the Szczecin region, by BLÜTHGEN (1919) (a south — and central — European species), and

H. nigripes LEP., reported from the Wrocław region, by DIETTRICH (1903), and found in Sandomierz, in the Pieprzowe Mts. near Sandomierz and in Kazimierz on the River Vistula by NOSKIEWICZ.

The distribution of the genera of the family *Halictidae* other than *Halictus* LATR. (*Sphecodes* LATR., *Nomioides* SCHENCK, *Dufourea* LEP., *Halictoides* NYL., *Rhophites* SPIN., *Rhophitoides* SCHENCK and *Systropha* ILL.) is shown in table X (the accepted division of Poland, regions I—VI is like that discussed previously).

So far nineteen species of the genus *Sphecodes* LATR., one species of the genus *Nomioides* SCHENCK, two species of the genus *Dufourea* LEP., two species

Table XI

No.	Species	I	II	III	IV	V	VI
1.	*Sphecodes gibbus* (L.)			+	+	+	+
2.	*Sphecodes rufiventris* (Pz.)				+	+	+
3.	*Sphecodes reticulatus* THOMS.				+	+	+
4.	*Sphecodes monilicornis* (K.)	+			+	+	+
5.	*Sphecodes rubicundus* HAG.				+		+
6.	*Sphecodes pellucidus* SM.	+			+	+	+
7.	*Sphecodes divisus* (K.)	+			+	+	+
8.	*Sphecodes punctipes* THOMS.	+		+	+	+	+
9.	*Sphecodes longulus* HAG.				+	+	+
10.	*Sphecodes niger* HAG.				+	+	+
11.	*Sphecodes ferruginatus* HAG.	+			+	+	+
12.	*Sphecodes hyalinatus* HAG.	+			+	+	+
13.	*Sphecodes crassus* THOMS.				+	+	+
14.	*Sphecodes croaticus* MAYER					+	
15.	*Sphecodes miniatus* HAG.	+		+	+	+	+
16.	*Sphecodes marginatus* HAG.				+	+	+
17.	*Sphecodes fasciatus* HAG.	+			+		+
18.	*Sphecodes scabricollis* WESMAEL					+	+
19.	*Sphecodes albilabris* (K.)				+	+	+
20.	*Nomioides minutissima* (ROSSI)				+		
21.	*Dufourea vulgaris* SCHENCK	+		+	+	+	+
22.	*Dufourea halictula* NYL.				+	+	+
23.	*Halictoides dentiventris* (NYL.)	+		+	+	+	+
24.	*Halictoides inermis* (NYL.)				+	+	+
25.	*Rhophites quinquespinosus* SPIN.	+		+	+	+	+
26.	*Rhophites trispinosus* PER.					+	
27.	*Rhophites hartmani* FRIESE			+		+	
28.	*Rhophitoides canus* EV.	+			+	+	+
29.	*Systropha curvicornis* (SCOP.)				+	+	+
30.	*Systropha planidens* GIR.					+	

of the genus *Halictoides* NYL., three species of the genus *Rhophites* SPIN., one species of the genus *Rhophitoides* SCHENCK and two species of the genus *Systropha* ILL. have been found in Poland. Thus, ninety-three species of the family *Halictidae* occur in Poland. In the Pieniny Mts. twenty-two species of this family have been found. Among them, there are eight species of the genus *Sphecodes* LATR., one species of the genus *Dufourea* LÉP., one species of the genus *Halictoides* NYL., one species of the genus *Rhophites* SPIN. and one species of the genus *Rhophitoides* SCHENCK. Five species of the above mentioned genera have previously been reported from the Polish Carpathians, these are:

Sphecodes punctipes THOMS., reported from Zakopane by ŚNIEŻEK (1910),

Sphecodes miniatus HAG., reported from Gubałówka by NOSKIEWICZ (1920),

Dufourea vulgaris SCHENCK, reported from Poręba Wielka, Nowy Targ and Zakopane by ŚNIEŻEK (1910), moreover from the Czechoslovakian Tatra Mts. in Svábovice by MOSCÁRY (1918),

Halictoides dentiventris (NYL.), reported from Żegiestów by ŚNIEŻEK (1910), and from the Czechoslovakian Tatra Mts., in Svabovice, by MOSCÁRY (1918),

Rhophites quinquespinosus SPIN., reported from Poręba Wielka and Żegiestów by ŚNIEŻEK (1910).

Other species found in the Pieniny Mts. are new to the fauna of the Polish Carpathians. Moreover, two other species are known from the Polish Carpathians. These are: *Sphecodes gibbus* (L.), mentioned from Nowy Targ, by ŚNIEŻEK, in 1910, and *Rhophites hartmani* FRIESE, recorded from the region of Przemyśl and from Jarosław, by KRYSIŃSKI, in 1957. MOSCÁRY, in 1918, reported *Rhophitoides canus* EV. from Poprad in the Czechoslovakian Carpathians.

All thirteen species found in the Polish Carpathians are, excepting, perhaps, *Rhophites hartmani* FRIESE, most probably distributed throughout Poland. *Sphecodes ferruginatus* HAG. has recently been found in Silesia by NOSKIEWICZ. Other twelve species of the group under consideration have been reported from whole of Poland except for the Carpathians, and at least a part of them is expected to occur in the Polish Carpathians. Here belongs *Sphecodes rubicundus* HAF. and *S. scabricollis* WESMAEL, which are very widely spraed. The remaining seven species are known in Poland only in few localities. Of these, six species are probably of south-eastern or southern origin and in Poland they occur in the xerothermic regions:

Sphecodes croaticus MAYER, found by NOSKIEWICZ (1952) in Krzyżanowice on the River Nida,

Nomioides minutissima ROSSI, recorded from Wrocław by DITTRICH, in 1903,

Rhophites hartmani FRIESE, recorded from Sandomierz, by NOSKIEWICZ (1952), moreover found in Subcarpathian region,

Systropha planidens GIR., found by NOSKIEWICZ (1962) in Krzyżanowice on the River Nida,

Rhophites trispinosus PER., recorded by STOECKHERT (1932) from the Poznań region, on the basis of the Berlin collections (this species ranges to northern Germany).

2. Zoogeographic analysis and the origin of the species of the *Halictidae* in the Pieniny Mts.

The members of the family *Halictidae* living in the Pieniny Mts. belong to the following groups (given after paper of STOECKHERT, 1932).

a. Species spraed throughout the Palaearctic Region:

Halictus lucidulus (SCHENCK)
Halictus calceatus (SCOP.)

b. Species distributed in Europe and the palaearctic regions of Asia:
Halictus maculatus SM.
Halictus tumulorum (L.)
Halictus fulvicornis (K.)
Sphecodes monilicornis (K.)

c. Species known from North Africa, Europe and Central Asia:
Halictus leucozonius (SCHRANK)
Halictus villosulus (K.)
Halictus albipes (FABR.)
Sphecodes punctipes THOMS.

d. Species found only in Europe:
Halictus quadrinotatus (K.)
Halictus laevis K.

e. Species known only from Central Europe:
Halictus lativentris (SCHENCK)
Halictus intermedius SCHENCK

f. Euro-Siberian species:
Halictus rubicundus (CHRIST)
Halictus leucopus (K.)
Halictus rufitarsis ZETT.
Halictus niger VIER.
Sphecodes hyalinatus HAG.
Sphecodes fasciatus HAG.

g. Species distributed in North and Central Europe:
Dufourea vulgaris SCHENCK
Halictoides dentiventris (NYL.) (considered by STOECKHERT, 1932), as a Boreal-Alpine species, however, distributed in many lowland localities in Central Europe.

h. Species known from South and Central Europe, Caucasus and Asia Minor:
Sphecodes ferruginatus HAG.
Sphecodes marginatus HAG.

i. Species distributed in Central and South Europe:
Halictus simplex BLÜTHGEN
Halictus aeneidorum ALFKEN.

As can be seen from the above data, the species of the family *Halictidae* found in the Pieniny Mts. are widely distributed in Europe and Asia. Some of them are of Siberian origin, while only four species are of south-eastern and southern origin and these are xerothermophilous insects. However, the latter species range to northern Poland. The species of exceptional xerothermic preference have not been found in the Pieniny Mts. Such species occur in the xerothermic regions in Central Poland, Silesia, in the regions of Przemyśl and Jarosław and in the Subcarpathian region.

3. The species of the family *Halictidae* in the habitats of the Pieniny Mts.

The distribution of the *Halictidae* in the individual habitats, marked I—VIII (explanation given previously) is shown in table XII. The presence of the species in the individual habitats is marked with +, and the probable occurrence with ?

Table XII

No.	Species	I	II	III	IV	V	VI	VII	VIII
1.	*Halictus rubicundus* (CHRIST)					+			+
2.	*Halictus simplex* BLÜTHGEN			+	+	+	+		+
3.	*Halictus maculatus* SM.					+	+	+	
4.	*Halictus tumulorum* (L.)			+		+	+	+	+
5.	*Halictus nitidus* (PZ.)					+	+	+	
6.	*Halictus quadrinotatus* (K.)								+
7.	*Halictus lativentris* (SCHENCK)					+	+		+
8.	*Halictus leucozonius* (SCHRANK)					+	+	+	
9.	*Halictus villosulus* (K.)					+	+	+	+
10.	*Halictus leucopus* (K.)		+	+		+	+	+	+
11.	*Halictus intermedius* SCHENCK						+		+
12.	*Halictus lucidulus* (SCHENCK)						+		
13.	*Halictus rufitarsis* ZETT.						+		
14.	*Halictus niger* VIER.		+		+	+	+	+	+
15.	*Halictus fulvicornis* (K.)				+	+	+	+	+
16.	*Halictus laticeps* SCHENCK				+	+	+	+	+
17.	*Halictus aeneidorsum* ALFKEN					+	+		
18.	*Halictus calceatus* (SCOP.)		+	+	+	+	+	+	+
19.	*Halictus albipes* (FABR.)		+	+	+	+	+		+
20.	*Halictus laevis* (K.)						+		+
21.	*Sphecodes monilicornis* (K.)						+		+
22.	*Sphecodes pellucidus* SM.						+		+
23.	*Sphecodes divisus* (K.)				+	+	+		+
24.	*Sphecodes puncticeps* THOMS.					+	+		
25.	*Sphecodes ferruginatus* HAG.						+		
26.	*Sphecodes hyalinatus* HAG.						+		
27.	*Sphecodes miniatus* HAG.						+		
28.	*Sphecodes fasciatus* HAG.						+		
29.	*Dufourea vulgaris* SCHENCK					+	+	+	
30.	*Halictoides dentiventris* (NYL.)			+	+	+	+		
31.	*Rhophites quinquespinosus* SPIN.			+		+	+		
32.	*Rhophitoides canus* (EV.)			+		+	+		

The fauna of the *Halictidae* of the northern slopes of the Pieniny Mts. is rather poor and is similar to the fauna of the *Andrenidae*. No species of *Halictidae* has been found in the thick, moist woods of the northern slopes and only four species were collected in the meadows and glades (habitat II). These are: *Halictus leucopus* (K.), *H. niger* VIER., *H. calceatus* (SCOP.) and *H. albipes* (FABR.). *H. calceatus* (SCOP.) and *H. albipes* (FABR.) were found in the Tatra Mts. (NOSKIEWICZ, 1920), but *H. leucopus* (K.) and *H. niger* VIER. are new to the fauna of the Polish Carpathians. It is expected that at least *H. niger* VIER., which was found in the top parts of the northern slopes in the Pieniny Mts., should also be found in the Tatra Mts. On the other hand, *H. villosulus* (K.), found in the Tatra Mts. by NOSKIEWICZ (1920), is supposed to occur on the northern slopes of the Pieniny Mts. The species occurring on the northern slopes of the Pieniny Mts. were, in most cases; found in all the habitats discussed in this paper. Five species appear in the well insolated woods of the southern slopes. These woods are rich in plants which are in flower for the whole of the summer. These species are as follows: *Halictus simplex* BLÜTHGEN, *H. tumulorum* (L.), *Halictoides dentiventris* (NYL.), *Rhophites quinquespinosus* SPIN. and *R. canus* (EV.). Moreover, in the forest of the southern slopes (habitat III) another three species were found, which also occur on the northern slopes. Of eight species found in habitat III, four also appear in the glades of the Trzy Korony massif (habitat IV) where eight species were found. Nine species appear in the fields and meadows of Sromowce (three of which were also found in the above mentioned habitats). However, the richest in species of the *Halictidae* are meadows, screes and rocks of the southern slopes (habitats V and VI), where thirty-one species were found. Most of the members of the genus *Sphecodes* LATR. were found only in the habitat VI. Very rich in species of the *Halictidae* are also osiers by the Dunajec River, where three species of the genus *Sphecodes* LATR. were also found.

The most abundant species of the *Halictidae* in the Pieniny Mts. are *Halictus calceatus* (SCOP.) and *H. albipes* (FABR.). Moreover, very common are also *H. simplex* BLÜTHGEN, *H. leucopus* (K.), *H. niger* VIER., *H. fulvicornis* (K.), *H. laticeps* SCHENCK, *Dufourea vulgaris* SCHENCK and *Halictoides dentiventris* (NYL.).

4. The phenological and biological observations on the species of the family *Halictidae* in the Pieniny Mts.

Two groups of species can be distinguished in the family *Halictidae*. The first comprises the species which are on the wing in the Pieniny Mts. from spring (often from first half of April). Here belong the members of the genera *Halictus* LATR. and *Sphecodes* LATR. Other genera of the *Halictidae*, *Dufourea* LÉP., *Halictoides* NYL., *Rhophites* SPIN. and *Rhophitoides* SCHENCK were collected in summer. The time of appearance of the *Halictidae* found in the Pieniny Mts. is shown in table XIII (marked as in previous tables).

As is seen in table XIII, the species of the genus *Halictus* LATR. are the earliest of the *Halictidae* on the wing in the Pieniny Mts. In most cases in the first half

Table XIII

No.	Species	IV		V		VI		VII		VIII		IX	
		1	2	1	2	1	2	1	2	1	2	1	2
1.	*Halictus rubicundus* (CHRIST)		♀	♀			♀						
2.	*Halictus simplex* BLÜTHGEN				♀	♀	♀	♂♀	♂♀	♂♀	♂♀	♀	
3.	*Halictus maculatus* SM.			♀	♀		♀	♀					
4.	*Halictus nitidus* (PZ.)			♀	♀		♀			♂			
5.	*Halictus tumulorum* (L.)		♀	♀	♀	♀	♀	♀		♂♀	♂		
6.	*Halictus quadrinotatus* (K.)							♀					
7.	*Halictus lativentris* (SCHENCK)				♀	♀	♀	♀			♀		
8.	*Halictus leucozonius* (SCHRANK)					♀	♀			♂			
9.	*Halictus villosulus* (K.)			♀	♀	♀	♀	♀		♂♀	♂♀		
10.	*Halictus leucopus* (K.)	♀		♀	♀	♀	♂♀	♂♀	♀	♂♀	♂♀	♂	♂
11.	*Halictus intermedius* SCHENCK							♀		♂			
12.	*Halictus lucidulus* (SCHENCK)										♀		
13.	*Halictus rufitarsis* ZETT.						♀						
14.	*Halictus niger* VIER.	♀	♀	♀	♀		♀	♀	♂	♂♀	♀		
15.	*Halictus fulvicornis* (K.)	♀	♀	♂♀	♀		♀			♀	♂♀		
16.	*Halictus laticeps* SCHENCK	♀	♀	♀	♀	♀	♀	♀	♀	♂♀	♂♀		
17.	*Halictus geneidorsum* ALFKEN	♀		♀	♀	♀	♀	♀	♀	♂♀	♂♀		
18.	*Halictus calceatus* (SCOP.)	♀	♀	♀	♂♀	♀	♀	♂♀	♂♀	♂♀	♂♀	♂	
19.	*Halictus albipes* (FABR.)		♀	♀	♀	♀	♀	♀	♂♀	♂♀	♂♀		♀
20.	*Halictus laevis* K.						♀				♀		
21.	*Sphecodes monilicornis* (K.)				♀		♀			♂			
22.	*Sphecodes pellucidus* SM.			♀	♀								
23.	*Sphecodes divisus* (K.)			♀	♀	♀			♀				
24.	*Sphecodes puncticeps* THOMS.						♀			♀	♂		
25.	*Sphecodes ferruginatus* HAG.			♀	♀		♀			♀		♀	
26.	*Sphecodes hyalinatus* HAG.			♀	♀		♀			♀			
27.	*Sphecodes miniatus* HAG.				♀						♂		
28.	*Sphecodes fasciatus* HAG.										♂		
29.	*Dufourea vulgaris* SCHENCK							♂♀		♂♀			
30.	*Halictoides dentiventris* (NYL.)						♂	♂♀	♂♀	♂♀	♂♀		
31.	*Rhophites quinquespinosus* SPIN.						♂	♂♀					
32.	*Rhophitoides canus* (EV.)						♂	♀		♀			

of April and in May have been collected the females. The species of this genus, except those found in few individuals (*H. quadrinotatus* (K.), *H. intermedius* SCHENCK, *H. lucidulus* (SCHENCK), *H. rufitarsis* ZETT. and *H. laevis* K.), are active in the spring, summer, and some species also in the autumn. The males appear later than the females. However, the males of *H. fulvicornis* (K.) and *H. calceatus* (SCOP.) were found in May and those of *H. leucopus* (K.) in the second half of June. The main mating period is in July and August. The males of some species (*H. simplex* BLÜTHGEN, *H. leucopus* (K.) and *H. calceatus* (SCOP.) have been observed as late as September.

The members of the genus *Sphecodes* LATR. appear, in the Pieniny Mts., a month after the species of the genus *Halictus* LATR. are on the wing. The females have been observed in early May. Then, in May, June and July only females appear. The males were collected only in August when mating takes place between species of the genus under consideration. The early spring species of the genus *Sphecodes* Latr., such as *S. balbilabris* (K.) (and its host species *Collectes cunicularis* (L.) have not been found in the Pieniny Mts.

A different group of species form *Dufourea vulgaris* Schenck, *Halictoides dentiventris* (Nyl.), *Rhophites quinquespinosus* Spin. and *Rhophitoides canus* (Ev.). The males of these species begin their active lives in the second half of June, whilst the females are on the wing from the first half of July. All these four species are on the wing in July. In August *R. quinquespinosus* Spin. is over. The period of the activity of the other species lasts throughout August. Two species, namely, *Dufourea vulgaris* Schenck and *Halictoides dentiventris* (Nyl.) have been observed in August in both sexes.

The members of the genus *Halictus* Latr. are polyphagous. They have been observed in the Pieniny Mts. to visit the most common flowering plants. In the spring they visit mostly *Tussilago farfara* (L.), *Salix* L. and *Taraxacum officinale* (L.). In June, July and August these species of *Halictus* Latr. visit many plants which are in flower, and which, in most cases, may be found in all the distinguished habitats. These plants are: *Campanula* L., *Coronilla* L., *Leonthodon* L., *Fragaria* L., *Thymus* L., *Mentha* L., *Scabiosa* L., *Anthemis* L., *Echium* L. and *Veronica* L. They were also collected in the neighbourhood of their nests, where their parasites, *Sphecodes ferruginatus* Hag. and *S. hyalinatus* Hag. were observed. These parasites were also collected on *Fragaria* L. The remaining species of the family *Halictidae* were found only on the following plants: *Dufourea vulgaris* Schenck on *Leonthodon* L., *Halictoides dentiventris* (Nyl.) in most cases on *Campanula* L., and *Rhophites quinquespinosus* Spin. on *Echium vulgare* L., *Stachys germanica* L., and *Campanula* L.

IV. ZOOGEOGRAPHIC AND ECOLOGICAL CHARACTERISTICS OF THE SPECIES OF THE FAMILY *MELITTIDAE* FOUND IN THE PIENINY MTS.

1. A comparison of the *Melittidae* of the Pieniny Mts. with the species of this family in Poland

So far ten species of the family *Melittidae* have been found in Poland. The distribution of these species in Poland is shown in table XIV (the distinguished regions I—VIII are as in other tables, the occurrence of the individual species is marked with +).

All three species of the family *Melittidae* found in the Pieniny Mts. have previously been reported from the Polish Carpathians, thus *Melitta leporina* (Pz.), was recorded from Żegiestów (Śnieżek, 1910), *M. haemorrhoidalis* (Fabr.) was cited from Żegiestów, Chabówka, and Zakopane (Śnieżek, 1910), from

Table XIV

No.	Species	I	II	III	IV	V	VI
1.	*Melitta leporina* (Pz.)	+		+	+	+	+
2.	*Melitta tricincta* K.				+	+	+
3.	*Melitta nigricans* ALFKEN				+	+	+
4.	*Melitta wankowiczi* (RAD.)					+	+
5.	*Melitta haemorrhoidalis* (FABR.)	+		+	+	+	+
6.	*Dasypoda hirtipes* (FABR.)				+	+	+
7.	*Dasypoda argentata* Pz.				+	+	+
8.	*Dasypoda mixta* RAD.					+	+
9.	*Macropis labiata* (FABR.)				+	+	+
10.	*Macropis fulvipes* (FABR.)	+		+	+	+	+

Gubałówka (NOSKIEWICZ, 1920), moreover from Poprad and Svábovice in the Czechoslovakian Tatra Mts. (MOSCÁRY, 1918) and *Macropis fulvipes* (FABR.) was quoted from Poręba Wielka (ŚNIEŻEK, 1910). It is of interest to note that *Macropis labiata* (FABR.) was found in Svábovice in the Czechoslovakian Carpathians, by MOSCÁRY (1918). No species of the *Melittidae* has as yet been found in the Polish Tatra Mts. The species found in the Pieniny Mts. and in other ranges of the Polish Carpathians are distributed in Europe and occur in all distinguished regions of Poland. Moreover, five species of this family appear in all regions of Poland except for the Carpathians. Of these, *Dasypoda argentata* Pz. was found by NOSKIEWICZ in the Pieprzowe Góry near Sandomierz (this species has not hitherto been known in Central Poland). Two remaining species are probably distributed only in northern and central Poland. *Melitta wankowiczi* (RAD.) was reported from Opatów (DROGOSZEWSKI, 1932) and Great Poland (SZULCZEWSKI, 1948), moreover it was found by NOSKIEWICZ in Rembertów near Warszawa. All these localities are in central Poland. This species, however, was quoted from the Vilnius region (ADOPLH, 1934), and may be found in northern Poland. *Dasypoda mixta* (RAD.) was quoted from the Poznań region (TORKA, 1913) and from the Mazurian Lake District (MÖSCHLER, 1938).

2. Ecological and phenological characteristics of the species of the *Melittidae* in the Pieniny Mts.

Of three species of the *Melittidae* found in the Pieniny Mts., two were found only as single specimens while the third species *Melitta haemorrhoidalis* (FABR.) was found to be common in that region. The distribution of the *Melittidae* in the habitats of the Pieniny Mts. is shown in table XV (the accepted division and marks are like those in tables given previously).

Melitta haemorrhoidalis (FABR.) was found in all habitats except for thick, moist woods of the northern slopes. This species is expected to occur in the

Table XV

No.	Species	I	II	III	IV	V	VI	VII	VIII
1.	*Melitta leporina* (Pz.)			+					
2.	*Melitta haemorrhoidalis* (FABR.)		+	+	+	+	+	+	+
3.	*Macropis fulvipes* (FABR.)						+		

Tatra Mts, as it is present in the meadows of the northern slopes of the Pieniny Mts.

The data on the time of the appearance of the species of the *Melittidae* in the Pieniny Mts. are shown in table XVI (marked like tables given previously).

Table XVI

No.	Species	VI		VII		VIII	
		1	2	1	2	1	2
1.	*Melitta leporina* (Pz.)					♀	
2.	*Melitta haemorrhoidalis* (FABR.)	♂	♂	♂♀	♂♀	♂♀	♂♀
3.	*Macropis fulvipes* (FABR.)		♀	♂			

All three species of the *Melittidae* in the Pieniny Mts. belong to the summer fauna. The males of *Melitta hemorrhoidalis* (Pz.) are on the wing from early June and the males from July. Both sexes were found to visit only *Campanula* L. Only one specimen of *Melitta leporina* (Pz.) was found *Macropis fulvipes* (FABR.) visits *Ranunculus* L.

V. ZOOGEOGRAPHIC AND ECOLOGICAL ANALYSIS OF THE SPECIES OF THE GENUS *NOMADA* SCOP. *(APIDAE)* IN THE PIENINY MTS.

1. A comparison of the genus *Nomada* SCOP. in the Pieniny Mts. with the fauna of this genus in Poland

A distribution of the species of the genus *Nomada* SCOP. found in Poland is shown in table XVII (the accepted division of Poland is like that given previously, the occurrence of the individual species is marked with +, and the probable occurrence with?).

Of forty-seven species occurring in Poland, nineteen have been found in the Pieniny Mts. Of these, *N. baeri* STOECKHERT is new to the fauna of Poland. Three species found in the Pieniny Mts. have previously been reported from the Polish Carpathians, these are: *Nomada sexfasciata* Pz., quoted from Żegiestów (ŚNIEŻEK, 1910), *N. flavoguttata* (K.), reported from Ku Dziurze Valley in the Tatra Mts. (NOSKIEWICZ, 1920), and *N. armata* H.-SCH., recorded from Że-

Table XVII

No.	Species	I	II	III	IV	V	VI
1.	*Nomada goodeniana* (K.)	+		?	+	+	+
2.	*Nomada fucata* Pz.				+	+	+
3.	*Nomada lepeletieri* PÉR.					+	
4.	*Nomada lineola* Pz.	+		?	+	+	+
5.	*Nomada marshamella* (K.)	+		?	+	+	+
6.	*Nomada sexfasciata* (Pz.)	+		+	+	+	+
7.	*Nomada rufipes* FABR.				+	+	+
8.	*Nomada errans* LÉP.			+		+	
9.	*Nomada flavopicta* (K.)		+	?	+	+	+
10.	*Nomada emarginata* MOR.	+			+		
11.	*Nomada roberjectiana* (Pz.)				+	+	+
12.	*Nomada tormentillae* ALFKEN		+	+			+
13.	*Nomada montana* MOSCÁRY		+				
14.	*Nomada obtusifrons* NYL.			+	+		
15.	*Nomada lathburiana* (K.)				+	+	+
16.	*Nomada hillana* (K.)				+	+	+
17.	*Nomada braunsiana* SCHENCK						+
18.	*Nomada guttulata* SCHENCK	+			+	+	+
19.	*Nomada zonata* Pz.	+			+	+	
20.	*Nomada rhenana* MOR.				+	+	
21.	*Nomada obscura* ZETT.				+		
22.	*Nomada ruficornis* (L.)	+			+	+	+
23.	*Nomada signata* JUR.				+	+	
24.	*Nomada flava* Pz.	+			+	+	
25.	*Nomada glabella* THOMS.				+	+	
26.	*Nomada leucophtalma* (K.)	+			+	?	+
27.	*Nomada ferruginata* (L.)	+			+	+	+
28.	*Nomada bifida* THOMS.	+			+	+	+
29.	*Nomada opaca* ALFKEN					+	+
30.	*Nomada moeschleri* ALFKEN					+	+
31.	*Nomada alboguttata* H.-SCH.	+			+	+	+
32.	*Nomada baccata* SM.				?	?	+
33.	*Nomada flavoguttata* (K.)	+	+	?	+	+	+
34.	*Nomada baeri* STOECKHERT	+					
35.	*Nomada conjugens* H.-SCH.	+			+	+	+
36.	*Nomada furva* Pz.			+	+	?	+
37.	*Nomada minuscula* NOSK.				+		
38.	*Nomada distinguenda* MOR.				+	+	+
39.	*Nomada fuscicornis* NYL.	+			+	+	+
40.	*Nomada similis* MOR.			+	+	+	+
41.	*Nomada armata* H.-SCH.	+		+	+	+	+
42.	*Nomada mutabilis* MOR.			+	+	+	+
43.	*Nomada femoralis* MOR.				+	+	+
44.	*Nomada cinnabarina* MOR.				+	?	+
45.	*Nomada fabriciana* (L.)	+			+	+	+
46.	*Nomada argentata* H.-SCH.				+	?	+
47.	*Nomada immaculata* MOR.					+	
48.	*Nomada trapeziformis* SCHMDK.				+		

giestów (Śnieżek, 1910) and from Svábovice in the Czechoslovakian Tatra Mts. (Moscáry, 1918). Moreover, another five species not found in the Pieniny Mts., occur in the Polish Carpathians. These are:

Nomada errans Lép., found in Sanok (leg. Noskiewicz),

N. obtusiformis Nyl., recorded from the Tatra Mts., Krynica and Sanok (Noskiewicz, 1920),

N. tormentillae Alfken, recorded from Krynica (Noskiewicz, 1958),

N. similis Mor., reported from Żegiestów (Śnieżek, 1910), and

N. mutabilis Mor., recorded from Zakopane (Śnieżek, 1910).

Moreover, Moscáry (1918) described *Nomada montana* Mosc. from the Tatra Mts. The total number of the species of *Nomada* Scop. found in the Polish Carpathians is twenty-four. Of these, nineteen species are probably distributed throughout the whole of Poland. *N. flava* Pz. has been collected by Noskiewicz in Silesia and at Rembertów near Warszawa. The remaining Carpathian species of the genus *Nomada* Scop. are very rare in Poland. Thus, *N. errans* Lép. is known from Nakło (Torka, 1913), *N. emarginata* Mor. was reported from Cieszyn region in Silesia (Stoeckhert, 1954) (this author did not mention the exact locality which therefore may be in Czechoslovakia), *N. tormentillae* Alfken is recorded from Kartuzy near Szczecin (Noskiewicz, 1958), and *N. zonata* Panzer from Silesia (Dittrich, 1903) and the Poznań region (Torka, 1913).

Thirteen species most probably are distributed throughout the whole of Poland except for the Carpathians. Such species include *N. signata* Jur. found near Wrocław by Puławski. Other species are known in Poland from only one or two localities. These are: *Nomada lepeletieri* Pér. recorded from Szczucin by Niesiołowski (1949), *N. braunsiana* Schenck recorded from the Mazurian Lake District by Alfken (1912) and Möschler (1938), from the Poznań region (Torka, 1934), *N. rhenana* Mor. reported from the Poznań region by Torka (1913) and Silesia by Ducke (1900), *N. obscura* Zett. recorded from Silesia by Torka (1925) and Stoeckhert (1954), *N. glabella* Thoms., found in Sobótka near Wrocław (leg. Noskiewicz), and recorded from Szczucin by Niesiołowski (1949), *N. opaca* Alfken cited from Szczucin by Niesiołowski (1949) and from Szczecin by Stoeckhert (1954), *N. moeschleri* Alfken reported from Nakło (Torka, 1934), from Łowicz (Drogoszewski 1934) and from Mazurian Lake District by Möschler (1938) and Łowicz by Drogoszewski (1932), *N. baccata* Sm. reported by Łoziński (1920) from Mazurian Lake District, and *N. immaculata* Mor. recorded by Łoziński (1920) from the Kraków region.

2. Zoogeographic analysis and the origin of the species of the genus *Nomada* Scop. found in the Pieniny Mts.

The following groups of species can be distinguished here:

a. Species distributed in Europe, North Africa and known from most of Palaearctic Asia:

Nomada ferruginata (L.)
N. flavoguttata (K.)

b. Species distributed throughout Europe:
N. goodeniana (K.)
N. lineola (Pz.)
N. marshamella (K.)
N. guttulata SCHENCK
N. ruficornis L.
N. fuscicornis NYL.
N. fabriciana (L.)

c. Species known only from north and central Europe:
N. flava Pz.
N. leucophtalma K.
N. bifida THOMS. (of these *N. bifida* THOMS. is, according to STOECKHERT, 1932, a Boreal-alpine species).

d. Species distributed in central and south Europe:
N. sexfasciata Pz.
N. zonata Pz.
N. alboguttata H.-SCH.
N. conjugens H.-SCH.
N. armata H.-SCH.
N. baeri STOECKHERT (?)

e. Species ranging in south Europe from Caucasus to France and known from only a few localities in central Europe:
N. emarginata MOR.

N. emarginata MOR. is a xerothermophilous species. The nearest localities in which this species has been collected are in Podolia, in southern Czechoslovakia and in Cieszynian Silesia (Ostrava region, ZAVADIL, 1948, STOECKHERT, 1954). Because of the lack of records it is not possible to conceive the route by which this species has reached the Pieniny Mts.

3. The species of the genera *Nomada* SCOP. and *Apis* L. in the habitats of the Pieniny Mts.

The distribution of the species of *Nomada* SCOP. and *Apis mellifica* L. in the habitats of the Pieniny Mts. is shown in table XVIII (the acepted division of habitats is like that given in other tables).

As is seen in table XVIII, on the northern slopes of the Pieniny Mts. only three species of the genus *Nomada* SCOP. were found. These species were collected exclusively in the meadows (habitat II). No species of this genus has been found in the thick, moist woods of the northern slopes (habitat I). *N. marshamella* (K.) should be found in the Tatra Mts., as it was collected in habitat II, even in the higher parts of the Pieniny Mts. The species occurring on the northern

Table XVIII

No.	Species	I	II	III	IV	V	VI	VII	VIII
1.	*Nomada goodeniana* (K.)		+				+		+
2.	*Nomada lineola* Pz.					+	+		
3.	*Nomada marshamella* (K.)		+			+	+		+
4.	*Nomada sexfasciata* Pz.						+		
5.	*Nomada emarginata* Mor.						+		
6.	*Nomada guttulata* Schenck					+	+		+
7.	*Nomada zonata* Pz.						+		
8.	*Nomada ruficornis* (L.)					+			
9.	*Nomada flava* Pz.					+			
10.	*Nomada leucophtalma* (K.)					+	+		
11.	*Nomada ferruginata* (L.)						+	+	
12.	*Nomada bifida* Thoms.		+			+			+
13.	*Nomada albuguttata* (K.)						+		+
14.	*Nomada flavoguttata* (K.)					+	+		
15.	*Nomada baeri* Stoeckhert								+
16.	*Nomada conjugens* H.-Sch.						+		
17.	*Nomada fuscicornis* Nyl.							+	
18.	*Nomada armata* H.-Sch.					+		+	
19.	*Nomada fabriciana* (L.)						+		
20.	*Apis mellifica* L.	+	+	+	+	+	+	+	+

slopes of the Pieniny Mts. were observed in habitats V, VI and VIII. Moreover, in habitat VIII, by the Dunajec River, *Nomada guttulata* Schenck, *N. alboguttata* H.-S. and *N. baeri* Stoeckhert occur. Most of the species of the genus *Nomada* Scop. found in the Pieniny Mts. prefer the warmest localities on the southern slopes and the lowest situated ones by the Dunajec River. *Apis mellifica* L. appears in the Pieniny Mts. in all the habitats discussed in this paper.

4. Phenological and biological observations on the species of the genus *Nomada* Scop. in the Pieniny Mts.

The phenological data on the members of the genus *Nomada* Scop. occurring in the Pieniny Mts. are shown in table XIX (marked as in the previous tables).

Two groups of species can be distinguished in the genus *Nomada* Scop. The species of the first group are on the wing in the spring while those of the second group are fewer in number and are on the wing in the summer. These are: *Nomada emarginata* Mor. and *Nomada fuscicornis* Nyl. which were observed in August. The former was collected on flowering *Allium* L. and *Scabiosa* L. and the latter in the neighbourhood of *Panurgus calceatus* (Scop.). Seven species of the spring group were found as early as April and both sexes were generally collected. Judging by the fact that the males of *Nomada bifida* Thoms. and *N. armata* H.-Sch. are on the wing again in the second half of May or the first half of July, one can suppose that these species are double-brooded. According to Stoeckhert (1932), *N. armata* H.-Sch. is on the wing from May until July. In the Pieniny Mts. the males of this species were observed in the second half of May and in the first half of July. The remaining species were observed mostly on flowering species of willows, *Tussilago farfara* L. and *Taraxacum officinale* L. *Nomada conjugens* H.-Sch., of which only a single specimen was found in the Pieniny Mts. in early August is, according to Stoeckhert (1932), on the wing in Franconia from May to June.

Table XIX

No.	Species	IV		V		VI		VII		VIII	
		1	2	1	2	1	2	1	2	1	2
1.	*Nomada goodeniana* (K.)		♂	♂	♂		♀				
2.	*Nomada lineola* Pz.	♂			♀						
3.	*Nomada marshamella* (K.)	♂♀	♂♀	♂♀							
4.	*Nomada sexfasciata* Pz.					♀					
5.	*Nomada emarginata* Mor.									♂	
6.	*Nomada guttulata* Schenck			♀	♀						
7.	*Nomada zonata* Pz.				♀						
8.	*Nomada ruficornis* (L.)			♂♀							
9.	*Nomada flava* Pz.	♂	♀		♂♀						
10.	*Nomada leucophtalma* (K.)	♂			♀						
11.	*Nomada ferruginata* (L.)				♀						
12.	*Nomada bifida* Thoms.	♂♀	♂♀	♂♀		♂					
13.	*Nomada alboguttata* H.-Sch.			♀		♀	♀				
14.	*Nomada flavoguttata* (K.)	♂			♂♀	♀					
15.	*Nomada baeri* Stoeckhert			♀							
16.	*Nomada conjugens* H.-Sch.							♀			
17.	*Nomada fuscicornis* Nyl.										♀
18.	*Nomada armata* H.-Sch.				♂			♂			
19.	*Nomada fabriciana*						♀				

REFERENCES

Adoplh W. 1934. Materiały do znajomości pszczół Wileńszczyzny. Prace TPN, Wilno, **8**: 217—254.

Albien W. 1905. Sammelbericht über meine in Sommer 1903 ausgeführte Excursion in die Kreise Thorn und Briesen. Ber. Westpr. bot.-zool. Ver., Danzig, **26**: 13—25.

Alfken J. D. 1909—1910. Beitrag zur Kenntnis der Apidenfauna von Ostpreussen. Schr. phys.-ökonom. Ges., Königsberg, **50**: 320—345.

Alfken J. D. 1909. Beitrag zur Kenntnis der Apidenfauna von Westpreussen. (Sammelbericht). Ber. Westpr. bot.-zool. Ver., Danzig, **31**: 101—123.

Alfken J. D. 1912. Die Bienenfauna von Westpreussen. Ber. Westpr. bot.-zool. Ver., Danzig, **34**: 1—96, 2 Taf.

Alfken J. D. 1913. Die Bienenfauna von Ostpreussen. Schr. phys.-ökonom. Ges., Königsberg, **53**: 114—182.

BAER W. 1903. Zur Bienenfauna der Kurischen Nehrung. Allg. Z. Ent., Neudamm, 8: 157—161.

BAER W. 1904. Zur Apidenfauna der preussischen Oberlausitz. Abh. naturw. Ges. Görlitz, 24: 107—121.

BALTHASAR V. 1941. Další příspěvek k poznání Hymenopter východní Moravy. (Opuscula Hymenopterologica III). Sbor. Kl. přír. Brno, 24: 3—10.

BALTHASAR V. 1943. Opuscula Hymenopterologica IV. Folia ent., Brno, 6 (2): 33—51.

BISCHOFF H. 1925. Beiträge zur Natur- und Kulturgeschichte Lithauens und angrenzender Gebiete. *Hymenoptera*. Abh. Bayer. Akad. Wiss., München, Suppl. 7: 278—337.

BLÜTHGEN P. 1919. Die Bienenfauna Pommerns. Stett. ent. Ztg., Stettin, 80: 65—131.

BLÜTHGEN P. 1942. Die Bienenfauna Pommerns. Stett. ent. Ztg., Stettin, 103: 81—91.

BLÜTHGEN P. 1944. Neue oder für Deutschland nene Bienen und Wespen. Mitt. Dtsch. ent. Ges., Berlin, 12: 24—31.

BLÜTHGEN P. 1951. Neue oder Wissenwertes über mitteleuropäischen Aculeaten und Goldwespen II. *(Hym.)*. Bonn. zool. Beitr., Bonn, 2: 229—234.

BRIESCHKE C. S. A. 1888. *Hymenoptera aculeata* der Provinzen West- und Ostpreussen. Schr. naturw. Ges., Danzig, 7: 85—106.

BRIESCHKE C. S. A. 1888. Bericht über eine Exkursion nach Hela während des Juli 1887. Schr. naturw. Ges., Danzig, 7: 42—64.

BRIESCHKE C. S. A. 1889. Bericht über eine Exkursion nach Steegen und frieschen Nehrung in Juli 1888. Schr. naturw. Ges., Danzig, 7: 193—209.

DITTRICH R. 1903. Verzeichnis der bisher in Schlesien aufgefundenen Hymenopteren. I. *Apidae*. Z. Ent., Breslau, 28: 19—54.

DITTRICH R. 1909. Hymenopterologische Bemerkungen Jhr. Ver. Schles. Ins. K., Breslau, 2: 38—46.

DROGOSZEWSKI K. 1932. Wykaz żądłówek zebranych w Polsce środkowej. Pol. Pis. ent., Lwów, 11: 113—118.

DROGOSZEWSKI K. 1934. Nowe dla Polski środkowej żądłówki. Pol. Pis. ent., Lwów, 13: 125.

DUCKE A. 1898. Die Bienenfauna Österreichisch-Schlesien. Ent. Nachr., Berlin. 24: 129—145.

DUCKE A. 1900. Nachtrag zur Bienenfauna Österreichisch-Schlesien. Ent. Nachr., Berlin, 26: 8—11.

DYLEWSKA M. 1958. Fauna trzmieli (*Bombus* LATR.) i trzmielców (*Psithyrus* LÉP.) Tatr Polskich. Acta zool. cracov., Kraków, 3: 137—197.

DYLEWSKA M. 1962. The *Apoidea* of the Pieniny National Park. Part I *Megachilidae* and *Apidae* (partim). Acta zool. cracov., Kraków, 7: 423—481.

KRYSIŃSKI S. 1957. Uwagi o faunie żądłówek *(Hym., Aculeata)* okolic Przemyśla. Pol. Pis. ent., Wrocław, 24: 303—309.

KUBES P. A. 1904. I. Conspectus *Apidarum*, quas in Bohemia collegi. Čas. čes. Spol. entom. Praha, 1: 26—31.

KUNZTE R. 1934. Problemy zoogeograficzne Pienin. Kosmos, Lwów, (B) 59: 217—242.

KUNZTE R. & NOSKIEWICZ J. 1938. Zarys zoogeografii Polskiego Podola. Lwów.

ŁOZIŃSKI P. 1920. Błonkówki pszczołowate okolic Krakowa. Spr. Kom. fizjogr., Kraków, 53—54: 125—134.

MACKO S. & NOSKIEWICZ J. 1954. Stanowisko rozchodnika białego *(Sedum album)* na Górze Wapiennej koło Stolca pod Ząbkowicami. Próba charakterystyki florystycznej i faunistycznej. Ochr. Przyr., Kraków, 22: 167—197.

MICHENER C. D. 1944. Comparative external morphology, phylogeny, and a classification of the bees *(Hymenoptera)*. Bull. Amer. Mus. nat. Hist., New York, 82: 153—326.

MINKIEWICZ R. 1935. *Myrmosa brunnipes* LÉPEL. tudzież inne żądłówki południowe lub rzadkie, wykryte w Polsce środkowej (na tle odnośnych zbiorowisk gniazdowania). Fragm. faun. Mus. zool. pol., Warszawa, 2: 189—227.

MOSCÁRY A. 1918. *Apidae*. [in] Fauna Regni Hungariae. Budapest.

MÖSCHLER A. 1938. Ein Beitrag zur Bienenfauna in Ostpreussen insbesondere der Kurischen Nehrung. Schr. phys.-ökonom. Ges., Königsberg, 70: 243—288.

NIESIOŁOWSKI W. 1949. Przyczynek do żądłówek Polski południowej. Pol. Pis. ent., Wrocław, **19**: 221—228.

NOSKIEWICZ J. 1918. Żądłówki nowe dla fauny Galicji. Spr. Kom. fizjogr., Kraków, **52**: 134—140.

NOSKIEWICZ J. 1920. Przyczynek do znajomości fauny żądłówek Tatr Polskich. Kosmos, Lwów, **45**: 145—155.

NOSKIEWICZ J. 1920. Z wycieczki hymenopterologicznej na Podole. Rozpr. Wiad. Muz. Dzieduszyckich, Lwów, **5—6**: 54—62.

NOSKIEWICZ J. 1920. Z wycieczki hymenopterologicznej na Podole II. Rozpr. Wiad. Muz. Dzieduszyckich, Lwów, **5—6**: 191—232.

NOSKIEWICZ J. 1922. Pszczołowate okolic Lwowa. Spr. Kom. fizjogr., Kraków, **56**: 157—179.

NOSKIEWICZ J. 1922. Żądłówki nowe dla Małopolski. Pol. Pis. ent., Lwów, **1**: 7—9.

NOSKIEWICZ J. 1923. Przyczynek do fauny żądłówek okolic Krakowa. Rozpr. Wiad. Mus. Dzieduszyckich, Lwów, **9**: 112—115.

NOSKIEWICZ J. 1934. Najważniejsze wyniki mych badań na Podolu w zakresie fauny błonkówek *(Hymenoptera)* w latach 1932—1935. Pol. Pis. ent., Lwów, **13**: 132—182.

NOSKIEWICZ J. 1947. Błonkówki i muchówki jako składniki stepowe zespołów Łysej Góry pod Złoczowem. Spr. Wrocł. TN, Wrocław, **2**: 84—86.

NOSKIEWICZ J. 1949. Obserwacje entomologiczne w pradolinie Baryczy. Czas. geogr., Wrocław, **19**: 31—59.

NOSKIEWICZ J. 1952. Kilka uwag o kserotermicznej faunie Wyżyny Małopolskiej. Pol. Pis. ent., Wrocław, **22**: 305—322.

NOSKIEWICZ J. 1958. Notatki faunistyczne z okolic Krynicy. Przegl. zool., Wrocław, **2**: 235—238.

PAX F. 1921. Die Tierwelt Schlesiens. Jena.

PITTIONI B. & SCHMIED R. 1942. Die Bienen des südostlichen Niederdonau I. *Apidae, Podaliridae, Xylocopidae* und *Ceratidae*. Niederdonau Nat. Kult., Wien—Leipzig, **19**: 3—69.

RICHARDS O. W. 1935. Notes on the nomenclature of the *Aculeata Hymenoptera*, with special reference to British genera and species. Trans. Roy. ent. Soc., London, **83**: 143—176.

RICHARDS O. W. 1936. Further notes on the nomenclature of British *Aculeata Hymenoptera*. Proc. Roy. ent. Soc., London, (B) **5**: 169—173.

SCHMIEDEKNECHT O. 1930. Die *Hymenoptera* Nord- und Mitteleuropas mit Einschluss von England, Südschweiz und Ungarn. Jena.

ŚNIEŻEK J. 1910. Błonkówki pszczołowate *(Apidae)*, zebrane w Galicji. Spr. Kom. fizjogr., Kraków, **44**: 31—46.

SPEISER P. 1906. Über eine Sammelreise in Kreise Oletzko. Schr. phys.-ökonom. Ges., Königsberg, **47**: 71—78.

SPEISER P. 1906. Einige seltene Hymenopteren der ost- und westpreusssischen Fauna. Schr. phys.-ökonom. Ges., Königsberg, **47**: 170—173.

SPEISER P. 1908. Notizen über Hymenopteren. Schr. naturw. Ges., Danzig, **12** (2): 31—57.

STOECKHERT F. K. 1933. Die Bienen Frankens *(Hym. Apid.)*. Dtsch. ent. Z., Berlin, 1932 Beiheft.

STOECKHERT F. K. 1954. Fauna *Apoideorum* Germaniae. Abh. Bayer. Ak. Wiss. math. Cl., (N. F.) **65**, 87 pp.

SZULCZEWSKI J. W. 1948. Błonkówki pszczołowate *(Apidae)* Wielkopolskiego Parku Narodowego. Prace monogr. Przyr. wielkop. Parku nar., Poznań, **2**: 69—90.

TORKA V. 1913. Die Bienen der Provinz Posen. Z. naturw. Ver., Posen, **20**: 97—181.

TORKA V. 1925. Seltene Bienen Oberschlesiens. Int. ent. Z., Guben, **18**: 249—251, 255—257.

TORKA V. 1927. Zur Bienenfauna Oberschlesiens. Int. ent. Z., Guben, **20**: 125—130.

TORKA V. 1916. Einige seltene Hymenopteren Posens. Z. naturw. Ver., Posen, **23**: 31—32.

TORKA V. 1934. Nachträge zu meiner Veröffentlichung über „Die Bienen der Provinz Posen". Dtch. wiss. Zeit. f. Polen, Posen, **26**: 83—94.

WIERZEJSKI A. 1868. Przyczynek do fauny błonkówek *(Hymenoptera)*. Spr. Kom. fizjogr., Kraków, **2**: 108—120.

WIERZEJSKI A. 1874. Dodatek do fauny błonkówek *(Hymenoptera)*. Spr. Kom. fizjogr., Kraków, **8**: 253—273.

ZAVADIL V. 1948. Zajímavé nálezy blanokřídého hmyzu *(Hymenoptera)* v oblasti Šířšího Ostravska. Přírod. Sborn., Ostrava, **9**: (1936—1948): 15—26.

STRESZCZENIE

Praca niniejsza stanowi drugą część opracowania fauny *Apoidea* Pienińskiego Parku Narodowego. Część I. (DYLEWSKA, 1962) objęła rodziny *Megachilidae* i *Apidae* (partim), część II pozostałe rodziny grupy *Apoidea*, a mianowicie *Colletidae*, *Andrenidae*, *Halictidae*, *Melittidae* oraz z rodziny *Apidae* rodzaj *Nomada* SCOP.

W Pieninach wykazano 7 gatunków z rodziny *Colletidae*, 40 gatunków z rodziny *Andrenidae*, 32 gatunki z rodziny *Halictidae*, 3 gatunki z rodziny *Melittidae* oraz 19 gatunków z rodzaju *Nomada* SCOP. Ogółem złowiono w Pieninach 211 gatunków należących do *Apoidea*.

Wśród gatunków opublikowanych w części II na uwagę zasługują: *Nomada baeri* STOECKH., nowy dla Polski. Jest to gatunek rzadki, znany ze środkowej i południowej Europy. Najbardziej interesujące dla Pienin są gatunki kserotermofilne, mające pochodzenie południowe lub południowo-wschodnie, znane tylko z nielicznych stanowisk w Europie środkowej. Są to: *Andrena agilissima* (SCOP.), *A. taraxaci* GIR., *A. paucisquama* NOSK. i *Nomada emarginata* MOR. Najbliższe stanowiska tych gatunków znajdują się częściowo na Podolu, w południowej Czechosłowacji, na Morawach oraz na Śląsku Cieszyńskim. *A. paucisquama* NOSK. znana jest także z terenów kserotermicznych środkowej Polski (Góry Pieprzowe koło Sandomierza oraz okolice Krakowa).

W części II podano 58 gatunków nowych dla Karpat Polskich. Łącznie zanotowano w Pieninach 84 gatunki nie zbierane jeszcze w Karpatach Polskich. Należą one przede wszystkim do grup szeroko rozsiedlonych w Europie i Azji, wiele z nich to gatunki nizinne nie znane z wysokich gór w Polsce. Ich obecność w Pieninach świadczy, podobnie jak gatunków kserotermofilnych, o wyjątkowo sprzyjających warunkach dla *Apoidea* w omawianym terenie. Poza tym Pieniny posiadają gatunki o pochodzeniu północnym lub północno-wschodnim, brak zaś gatunków górskich z omawianych rodzin, boreo-alpejskich natomiast jest bardzo niewiele (*Andrena tarsata* NYL. i *A. coitana* K.). Gatunki górskie i boreo-alpejskie, o ile chodzi o *Aculeata*, wykazano w Pieninach (DYLEWSKA 1962) także w rodzinach *Megachilidae* i *Apidae*. Rozsiedlają się one w górach zarówno w niższych, jak i w wyższych stanowiskach i należą do gatunków ogólnogórskich.

Charakterystyka ekologiczna fauny *Apoidea* Pienin wykazała ubóstwo zboczy północnych, na których spotykano często tylko trzmiele (*Bombus* LATR.) i pszczołę miodonośną (*Apis mellifica* L.). *Apoidea* zboczy północnych Pienin obserwowano prawie wyłącznie na łąkach, natomiast obszar lasów zboczy północnych jest prawie całkowicie pozbawiony omawianej fauny. Zbocza połud-

niowe Pienin, a głównie piargi i skały oraz łąki i murawy są najbogatsze ilościowo i jakościowo w faunę *Apoidea*. W niektórych odcinkach nad rzeką Dunajec także zanotowano bogatą faunę *Apoidea*, przede wszystkim występującą na *Salix* L. Piargi zboczy południowych gromadzą często na małych przestrzeniach gatunki nizinne, tajgowe, kserotermiczne, górskie i boreo-alpejskie.

W opracowaniach fenologicznych wyróżniono trzy grupy gatunków, a mianowicie: 1) wyłącznie letnie, najmniej liczne, 2) tylko wiosenne, odwiedzające głównie *Salix* L., *Taraxacum officinale* L. i *Tussilago farfara* L., oraz 3) pojawiające się wiosną i trwające przez lato w drugim pokoleniu. Do trzeciej najliczniejszej grupy należy większość gatunków rodzajów: *Andrena* F., *Halictus* Latr. i *Sphecodes* Latr.

РЕЗЮМЕ

Настоящая работа является второй частью обработки фауны *Apoidea* Пенинского Народного Парка.

Первая часть (Дылевска, 1962) охватывает семейства *Megachilidae* и *Apidae* (partim), вторая часть охватывает остальные семейства группы *Apoidea*, именно — *Colletidae*, *Andrenidae*, *Halictidae*, *Melittidae* и род *Nomada* (Scop.) из семейства *Apidae*.

В Пенинах отмечено 7 видов из семейства *Colletidae*, 40 видов *Andrenidae*, 32 вида *Halictidae*, 3 вида *Mellitidae* и 19 видов из рода *Nomada* Scop.

Среди видов опубликованных во второй части работы, заслуживает внимания новый для Польши вид *Nomada baeri* Stoeckh. Это редкий вид, известный из центральной и южной Европы. Найболее интересными для Пенин являются ксеротермические виды, южного либо юго-восточного происхождения, известные лишь из немногих местоположений центральной Европы. Это *Andrena angilissima* (Scop.), *A. taraxaci* Gir., *A. paucisquama* Nosk. и *Nomada emarginata* Mor. Ближайшие места выступания этих видов находятся частично на Подолье, в южной Чехословакии, в Моравах и в Цешинской Силезии. *A. paucisquama* Nosk. известен также из ксеротермической территории центральной Польши (Гуры Пепжове) возле Сандомежа и окрестности Кракова).

В второй части приведены 58 новых для Карпат видов. В общем, в Пенинах отмечено 84 видов, которые до сих пор не были собраны в Польских Карпатах. Принадлежат они в основном к группам широко распространенным в Европе и Азии, а многие из них — это низменные виды, до сих пор неизвестные для высоких гор Польши. Их присутствие в Пенинах свидетельствует, подобно потому как и ксеротермических видов, о исключительно благоприятных условиях для *Apidae* в рассматриваемой местности. В Пенинах обитают также виды северного либо северовосточного происхождения; совершенно нет горных видов из рассматриваемых семейств и немного имеется борео-альпийских видов (*Andrena tarsata* Nyl. и *A. coitana* K.). В Пенинах отмечены также горные и борео-альпийские виды

Aculeata из семейств *Megachilidae* и *Apidae* (Дылевска, 1962). Распространены они как в высоких так и в низких горах и принадлежат к общегорным видам.

Экологическая характеристика фауны *Apoidea* Пенин указывает на бедность северных склонов, на которых часто встречались лишь шмели (*Bombus* Latr.) и медоносные пчелы (*Apis mellifica* L.). *Apoidea* северных склонов Пенин отмечались почти исключительно на лугах и в лесах этих склонов почти не встречались. Наиболее богаты представителями *Apoidea*, в количественном отношении, являются оюжные склоны Пенин; в основном осыпи, скалы, луга и муравы. Обильная фауна *Apoidea* рекой Дунайцем, в основном на ивах (*Salix* L.). На малых участках осыпей южных склонов часто скопляются виды низменные, таежные, ксеротермические, горные и борео-альпийские.

В фенологическом отношении выделены три группы видов: 1) исключительно летние, самые малочисленные, 2) только весенние, посещающие в основном *Salix* L., *Taraxacum officinale* L. и *Tussilago farfara* L., и 3) появляющиеся весной и переживающие в течение лета во втором поколении. К наиболее многочисленной 3 группе принадлежит большинство видов из родов: *Andrena* F., *Halictus* Latr. и *Sphecodes* Latr.

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