ACTA THERIOLOGICA

VOL. XVI, 7: 95—104. BIAŁOWIEŻA April, 1971

Andrzej L. RUPRECHT

Distribution of *Myotis myotis* (Borkhausen, 1797) and Representatives of the Genus *Plecotus* Geoffroy, 1818 in Poland

[With 2 Figs]

The geographical ranges and distribution of three species of bats in Poland were examined on the basis of collections of owl pellets (n = 680 localities) and data in literature. Some new stations of the species are given. *Myotis myotis* was found on numerous stations (n = 94), thus extending its present range. A station with a colony of *M. myotis* situated to the extreme north-east was found at Wejherowo (54°37'N, 18°15'E). *Plecotus austriacus* was found on 63 new stations. The northern limit of the range of *P. austriacus* in Central Poland extends as far as 53° north geographical latitude. *Plecotus auritus* is distributed evenly over the whole of Poland. It occurred sympatrically with *P. austriacus* in 18 places. The northern limits of the range of *M. myotis* and *P. austriacus* in Poland are described.

I. INTRODUCTION

Only a relatively small amount of information has been obtained on the distribution of different species of bats in Poland. In view of the fact that many species of mammals reach the limits of their range in Poland, it would appear useful to trace the northern limit of the range of two southern species, *i.e. Myotis myotis* and *Plecotus austriacus*. The present paper is a continuation of studies undertaken earlier (Ruprecht & Tarczyński, 1965; Ruprecht, 1965) which it has now been possible to complete as the result of accumulating a suitable number of stations.

The information so far available on the distribution of *M. myotis* in Poland has been obtained from a large number of publications. Use has been made in this paper of reports on ringing bats (Kowalski *et al.*, 1957; Krzanowski, 1960), and also faunistic publications (Skuratowicz, 1948; Kowalski, 1953; Skuratowicz & Warchałewski, 1954; Jaskowski, 1956; Grodziński, 1957; Wołо-

szyn, 1962, 1964 and 1968; Cais, 1963a; Ruprecht & Tarczyński, 1965; Zdzitowiecki, 1970; and Kowalczyk, in prep.). In addition data contained in publications on the composition of owl pellets have been included (Czarnecki *et al.*, 1955; Cais, 1963b; and Kulczycki, 1964).

P. austriacus has been found in Poland on only a few stations (Kowalski, 1964; Wołoszyn, 1964 and 1965; and Ruprecht, 1965 and 1970).

As no faunistic studies earlier than 1964 made a clear distinction between these two species of the genus *Plecotus* living in Poland the data they contain cannot be used as a basis in investigations of their current distribution. Because of this new identifications were made on the original material used in these reports where accessible.

II. MATERIAL AND METHODS

Collections of owl pellets, chiefly those in the Mammals Research Institute, Polish Academy of Sciences, from approximately 680 localities covering the whole of Poland were used in the present study. Identifications of bats of the genus *Plecotus* in earlier collections of owl pellets in the Institute of Systematic Zoology of the A. Mickiewicz University in Poznań, were also investigated and checked. In addition reference was made to data from earlier publications on the distribution of these species of bats, and also individual bats found in church lofts and belfries during collection of owl pellets (*cf.* also Braaksma, 1969). Only those stations possessing full and unquestionable documentation (locality, administrative district) were taken into consideration. Measurements of the mandible were used to identify species of bats of the genus *Plecotus* (Ruprecht, 1969). All working stations were entered on a map with scale 1:1.000.000 which was then converted to the size required for the present publication.

Bats were found in 40% of the samples examined. Together with data from earlier publications the present discussions are based on 192 stations of *M. myotis*, 135 of *P. auritus* and 70 of *P. austriacus*.

III. RESULTS

Myotis myotis (Borkhausen, 1797)

The distribution of this species as far as is known at present, covers, according to Kowalski (1953, 1964), the southern part of Poland: Carpathians with the Tatra Mts and Carpathian foothill area, the Sudeten Mts, Lublin and Małopolska Uplands and Silesia region. In his opinion position of the northern limit of its range in Poland requires further study.

The material currently available on distribution of *M. myotis* justifies the conclusion that its range in Poland is far wider than hitherto supposed (Fig. 1).

Stations extending the range of *M. myotis* in Poland were found in the Wielkopolska lowland region, the south-west part of the Masovian lowland region, and the Wielkopolskie and Pomeranian lake districts.

Fig. 1. Distribution of *Myotis myotis* (B o r k h a u s e n, 1797) in Poland. Broken line indicates probable northern limit of the range of this species in Poland given by K o w a l s k i (1953).

The extreme north-west stations of *M. myotis* are at Stargard Szczeciński (53°20′N, 15°02′E), Pyrzyce, and Ostrowiec (Choszczno district). This species was several times observed to hibernate at Stargard during the period from 1965—1969 (K o w a l c z y k, in prep.). The station of *M.*

myotis furthest to the north-east No. 51980 in collection of the Mammals Research Institute, adult female) was found by T. Buchalczyk (M. Sc.) on April 29th 1966 in the church loft at Wejherowo (54°37′N, 18°15′E), where was a colony of ca 15 of these bats. Although the number of stations of this species found in the Pomeranian lake district is small, the fact of their extreme location along the Baltic coast justifies the assumption that this species occurs here more widely.

The northern limit of the range of *M. myotis* in Poland thus runs from Stargard Szczeciński — Wejherowo — Grudziądz — Kowalewo Pomorskie — Włocławek — Bełchów (Łowicz district) — Wola Gułowska (Łuków district) — Kosobudy (Zamość district) — Płazów (Lubaczów district).

M. myotis reaches the limit of its eastern European range in Poland and the south-west part of the Soviet Union. A larger number of stations of this species in the Soviet Union are located in the Ukraine (cf. Bobrinskij *et al.*, 1965). The dots indicating these stations form an extension of the line running through the Wola Gułowska, Kosobudy and Płazów localities. The station near Grodno [1]), situated in the immediate vicinity of the present eastern Polish frontier, diverges considerably from this range. In view of the tendency to lowering of the limit of this species' range in an easterly direction it would appear that this station may be of an island character, or that this might have been a random occurrence during migration.

The data obtained on occurrence of *M. myotis* in northern Poland apply only to individuals found during inspection of the bats' hiding places. The complete absence of bone remnants in the owl pellets from northern Poland would appear to form evidence of the rare occurrence of *M. myotis* in this region, since in places where *M. myotis* is known to be continously present the bones of these bats have often been found in owl pellets.

Plecotus austriacus Fischer, 1829

This species had hitherto been found in the Kraków environs (Kowalski, 1964), in the Kujawy region, near Łódź and Puławy (Ruprecht, 1965), Świętokrzyskie Mts and in Lower Silesia (Wołoszyn, 1964 and 1965), and in the Wielkopolska lowland region (Ruprecht, 1970).

P. austriacus has now been found in the following parts of Poland: The Lubuski region, Wielkopolska lowland region, Kujawy region, Kra-

[1]) Two specimens of this bat (coll. nos. 23249 and 23257) were caught in 1925 near Grodno by J. Jakimowicz. They are at present preserved in the collections of the Touring Regional Museum at Grodno, BSSR (Dr. A. N. Kurskov, pers. comm.).

ków—Częstochowa upland region, Małopolska upland region, Masovian lowland region, Świętokrzyskie and Sudety Mts, Lublin uplands and in the East Beskid Mts (Fig. 2). Occurrence of this bat in Sudety Mts is based on one specimen found in Kamienna Góra (coll. no. 34282, leg.

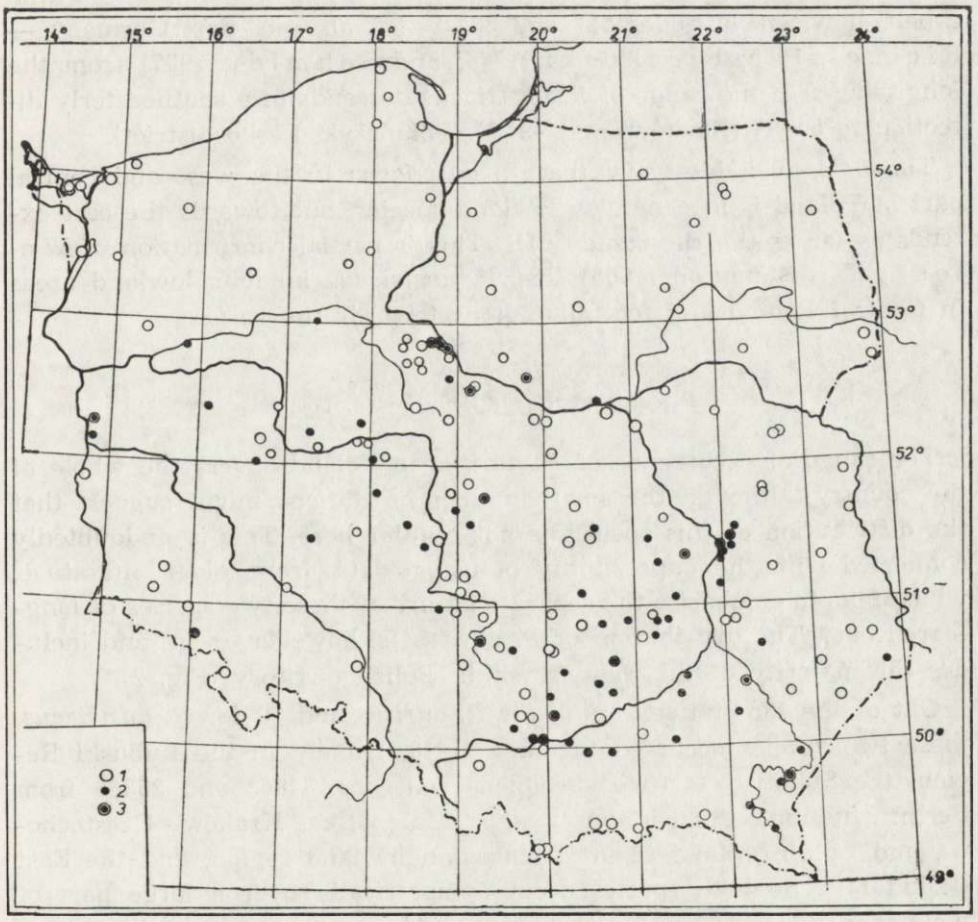

Fig. 2. Distribution of representatives of the genus *Plecotus* Geoffroy, 1818 in Poland.
1 — *Plecotus auritus* (Linnaeus, 1758), 2 — *Plecotus austriacus* Fischer, 1829, 3 — stations common to both species.

Dr. W. Arndt, det. Dr. K. Bauer) and preserved in collections of the Zoological Museum of the Humbold University in Berlin.

The northern limits of the range of *P. austriacus* in Central Poland extends to latitude 53° north. It runs through: Zielony Bór Forest District (Słubice district) — Drezdenko (Strzelce Krajeńskie district) —

Słupowa (Szubin district — 53°01′N, 17°23′E) — Ciechocinek (Aleksandrów Kujawski district) — Ciachcin (Płock district) — Zakroczym (Nowy Dwór Mazowiecki district) — Baranów (Puławy district) — Żulice (Tomaszów Lubelski district).

The majority of the stations of *P. austriacus* in Poland come within a belt between latitudes 51° and 53° N (cf. also in East Germany — Richter, 1965; Piechocki, 1966; and Schmidt, 1967) from the longitude 19°E the range of *P. austriacus* descends in a southeasterly direction to 50° N (Kraków) and 49° N (Polańczyk, Lesko district).

The data available show that *P. austriacus* in the west and central part of Poland is in general a lowland species, but towards the east extends as far as the Bieszczady Mts. This is partial confirmation of Wołoszyn's assumption (1965) that *P. austriacus* inhabits lowland areas in Central Poland and foothill regions towards the east.

Plecotus auritus (Linnaeus, 1758)

The range of occurrence of *P. auritus* in Poland covers the whole of the country, although the small number of stations might suggest that the distribution of this species is not regular here. This is undoubtedly connected with the impossibility of using data from older literature, which fails to emphasise the separate nature of these two species of long-eared bats. The distribution of *P. auritus* is, however, even, and includes the majority of the regions within Polish territory (Fig. 2).

Out of the 135 stations found for *P. auritus* and 70 for *P. austriacus*, these two species occurred together in 18, namely in the Lubuski Region, the Sudety Mts (two specimens coll. nos. 34863 and 35366 from Berlin Museum), the Kujawy Region, Małopolska, Kraków—Częstochowa und Lublin upland regions, Masovian lowland region, and the East Beskid Mts. So both species occur sympatrically over a large part of their range.

IV. DISCUSSION

The material available on distribution of *M. myotis* in Poland shows that this species extends as far as the Baltic coast in the west and northern part of Poland. These stations to a certain degree form confirmation of the earlier data given by Gaffrey (1944), who gives *M. myotis* from Greifswald and the Randow district (north-east limit of East Germany), and from Szczecin, as does also Ryberg (1947) in

giving this species from Gdańsk and Królewiec (now Kaliningrad). The data obtained confirm Ruprecht & Tarczyński's assumption (1965) that *M. myotis* is a species more wide-spread in the northern part of Poland and the Pomeranian region. A larger number of the stations of this species, are located in Central Poland (Poznań and Łódź voivodships), and would seem to indicate that in this part of the country *M. myotis* has a constant range and is one of the most common species of bats (cf. also Kowalczyk, in prep., and Nowosad, in prep.).

The stations of *M. myotis* in Pomerania indicate that they are not the result of current expansion of this species in a northely direction, since it was found here earlier (Gaffrey, 1944; Ryberg, 1947).

The fact is worthy of emphasis that the ranges of *M. myotis* and *P. austriacus* are similar in that their northern limits follow the annual isotherm 8° to 9°C. It is thus not impossible that temperature may to some degree limit the spread of these two species (cf. Ruprecht, 1965). It would appear probable that *M. myotis*, originally connected with mountain caves, spread to the Baltic coast on account of the hilly character of these areas and the suitable temperature conditions it finds there. Neither of these two species were found in north-east Poland, which is noted for low temperatures in the winter. The data given by Harmata (1969) in relation to connections between temperature preferences and distribution of bats would appear to provide confirmation of the above assumption.

The common occurrence of the two representatives of the genus *Plecotus* in Poland was confirmed both by examination of owl pellets and by catching in church lofts. These data indicate that the two species of *Plecotus* may occur simultaneously, at least in their summer hiding places (cf. also Stebbings, 1970), although it took never place in caves (cf. Wołoszyn, 1965, and also Hanák, 1969).

The accuracy of the results obtained is affected by the fact that bats as a rule occur very rarely in owl pellets, although in this study of the twenty species of bats living in Poland — nineteen were found in the 680 collections of owl pellets. This limits the degree to which this method can be applied to studies on the distribution of bats. On the other hand, however, it is possible to accumulate data from a large area fairly quickly. Sometimes these data include rare species (cf. Ruprecht, 1970). The bats' stations discovered by examination of owl pellets were obtained from the spring-summer period during which bats are active (cf. also Braaksma, 1969). They thus refer to the localities of their summer habitats or to places in which bats were captured by owls during their spring or autumn migrations. It is possible under these circumstances to trace the high degree of dispersal characterizing individuals

of the given species over the living range occupied and also to reveal stations difficult to discover by other methods.

Acknowledgements: The author would like to take this opportunity of expressing his thanks to Professor Dr. W. Skuratowicz, Dr. W. Harmata, and Dr. S. Zaborowski for making part of the material used available for this study. The author is particularly indebted to Dr. Z. Pucek and Dr. A. Krzanowski for critical examination of the first draft of this paper. My thanks are also due to A. Kowalczyk, M. Sc., for letting me use hitherto unpublished data on stations of *M. myotis*, and to all those who assisted me in achieving the aim I had in view.

REFERENCES

1. Bobrinskij N. A., Kuznetsov B. A. & Kuzyakin A. P., 1965: Opredelitel mlekopitajuščih SSSR. Izd. Prosveščenie: 1—382. Moskva.
2. Braaksma S., 1969: Summer-resorts of bats on lofts and towers of churches in the Netherlands. Lynx, *10*: 7—12.
3. Cais L., 1963a: Materiały do fauny ssaków województwa rzeszowskiego. Zesz. Nauk. UAM, Biol., *4*: 22—40. Poznań.
4. Cais L., 1963b: Badania nad składem pokarmu kilku gatunków sów. Zesz. Nauk. UAM, Biol., *4*: 1—21.
5. Czarnecki Z., Gruszczyńska J. & Smoleńska E., 1955: Badania nad składem pokarmu płomykówki (*Tyto alba guttata* (C. L. Br.)) w latach 1950—1952 w województwie poznańskim. PTPN, Prace Kom. Biol., *16*, 3: 1—37. Poznań.
6. Gaffrey G., 1944: Die rezenten wildlebenden Säugetiere Pommerns. Diss. Phil. Fak. Univ. Greifswald, 1944.
7. Grodziński W., 1957: Materiały do fauny kręgowców Bieszczad Zachodnich. Zesz. Nauk. UJ, 10, Zool. *1*: 177—221. Kraków.
8. Hanák V., 1969: Ökologische Bemerkungen zur Verbreitung der Langohren (Gattung *Plecotus* Geoffroy, 1818) in der Tschechoslovakei. Lynx, *10*: 35—39.
9. Harmata W., 1969: The thermopreferendum of some species of bats (*Chiroptera*). Acta theriol., *14*, 5: 49—62.
10. Jaskowski J., 1956: Ssaki pradoliny Baryczy i Orli. PTPN, Prace Kom. Biol., *18*, 2: 1—23.
11. Kowalczyk A.: Wykaz i omówienie gatunków nietoperzy z terenu Wielkopolski. MSC.
12. Kowalski K., 1953: Materiały do rozmieszczenia i ekologii nietoperzy jaskiniowych w Polsce. Fragm. Faun. Mus. Zool. Pol., *6*, 21: 541—567.
13. Kowalski K., Krzanowski A. & Wojtusiak R. J., 1957: Sprawozdanie z akcji obrączkowania nietoperzy w Polsce w latach 1939—1953. Acta theriol., *1*, 5: 109—158.
14. Kowalski K., 1964: Nietoperze — *Chiroptera*. [In: »Klucze do oznaczania kręgowców Polski. V. Ssaki — *Mammalia*«. Ed. K. Kowalski]. Państw. Wyd. Nauk.: 1—280. Warszawa—Kraków.
15. Krzanowski A., 1960: Investigations of flights of Polish bats, mainly *Myotis myotis* (Borkhausen, 1797). Acta theriol., *4*, 11: 175—184.
16. Kulczycki A., 1964: Badania nad składem pokarmu sów z Beskidu Niskiego. Acta zool. cracov., *9*, 9: 529—559. Kraków.
17. Nowosad A.: Przyczynek do znajomości rozmieszczenia nietoperzy okolic Poznania. MSC.

18. Piechocki R., 1966: Über die Nachweise der Langohr-Fledermäuse *Plecotus auritus* L. und *Plecotus austriacus* Fischer im mitteldeutschen Raum. Hercynia, *3*, 4: 407—415.
19. Richter H., 1965: Das Graue Langohr, *Plecotus austriacus* Fischer, 1829 in der Magdeburger Börde und in Sachsen. Säugetierkdl. Mitt., *13*, 1: 5—8.
20. Ruprecht A., 1965: Methods of distinguishing *Plecotus austriacus* Fischer, 1829 and new stations of this species in Poland. Acta theriol., *10*, 14: 223—228.
21. Ruprecht A. & Tarczyński S., 1965: New localities of *Myotis myotis* (Borkhausen, 1797) in North Poland. Acta theriol., *10*, 15: 229—232.
22. Ruprecht A. L., 1969: Taxonomic value of mandible measurements in the genus *Plecotus* Geoffroy, 1818. Acta theriol., *14*, 6: 63—68.
23. Ruprecht A. L., 1970: *Nyctalus lasiopterus* (Schreber, 1780) — a new species in the fauna of Poland. Acta theriol., *15*, 23: 370—372.
24. Ryberg O., 1947: Studies on bats and bat parasites especially with regard to Sweden and other neighbouring countries of the North. Bokförlaget Svensk Natur: XVI+1—330. Stockholm.
25. Schmidt A., 1967: Über das Graue Langohr, *Plecotus austriacus* Fischer, 1829, in Brandenburg. Ztschr. Säugetierkde, *32*, 4: 246—250.
26. Skuratowicz W., 1948: Badania nad fauną ssaków Zamojszczyzny. Fragm. Faun. Mus. Zool. Pol., *5*, 15: 233—292.
27. Skuratowicz W. & Warchalewski E., 1954: Przyczynek do fauny drobnych ssaków Podkarpacia. PTPN, Prace Kom. Biol., *15*, 2: 1—11.
28. Stebbings R. E., 1970: A comparative study of *Plecotus auritus* and *P. austriacus* (*Chiroptera, Vespertilionidae*) inhabiting one roost. Bijdragen tot de Dierkunde, *40*, 1: 91—94. Amsterdam.
29. Wołoszyn B. W., 1962: Nietoperze z jaskiń Gór Świętokrzyskich. Przegl. zool., *6*, 2: 156—162.
30. Wołoszyn B. W., 1964: Nowe obserwacje nad nietoperzami z jaskiń Gór Świętokrzyskich. Przegl. zool., *8*, 3: 286—292.
31. Wołoszyn B. W., 1965: Współczesne występowanie *Plecotus auritus* (L., 1758) i *Plecotus austriacus* (Fischer, 1829) w Polsce. Materiały na VIII Zjazd Pol. Tow. Zool., Olsztyn—Kortowo, 8—12 września 1965 roku: 83—85. Olsztyn.
32. Wołoszyn B. W., 1968: Badania nietoperzy Dolnego Śląska. Przegl. zool., *12*, 2: 208—220.
33. Zdzitowiecki K., 1970: Helminths of bats in Poland. I. Cestodes and trematodes of the family *Plagiorchiidae*. Acta parasit. pol., *17*, 20: 175—188.

Accepted, September 15, 1970.

Mammals Research Institute,
Polish Academy of Sciences,
Białowieża, woj. Białystok.

Andrzej L. RUPRECHT

MATERIAŁY DO ROZMIESZCZENIA *MYOTIS MYOTIS* (BORKHAUSEN, 1797) I PRZEDSTAWICIELI RODZAJU *PLECOTUS* GEOFFROY, 1818 W POLSCE

Streszczenie

W oparciu o zbiory zrzutek sów (n = 680) i dane z literatury zbadano zasięgi geograficzne i rozmieszczenie trzech gatunków nietoperzy w Polsce. *Myotis myotis* (Borkhausen, 1797) został stwierdzony na licznych stanowiskach (n = 94), poszerzających jego aktualnie znany zasięg, zlokalizowanych między innymi na terenie Niziny Wielkopolskiej, południowo-zachodniej części Niziny Mazowieckiej, Pojezierzu Wielkopolskim i Pomorskim. Maksymalnie na północny-wschód wysunięte stanowisko kolonii *M. myotis* stwierdzono w Wejherowie (54°37′N, 18°15′E). Północna granica zasięgu tego gatunku w Polsce przebiega przez: Stargard Szczeciński — Wejherowo — Grudziądz —Kowalewo Pomorskie — Włocławek — Bełchów pow. Łowicz — Wolę Gułowską pow. Łuków — Kosobudy pow. Zamość — Płazów pow. Lubaczów. *Plecotus austriacus* Fischer, 1829 został stwierdzony obecnie na 63 stanowiskach w następujących regionach Polski: Ziemi Lubuskiej, Sudetach, Nizinie Wielkopolskiej, Kujawach, Wyżynie Krakowsko-Częstochowskiej, Małopolskiej i Lubelskiej, Nizinie Mazowieckiej, Górach Świętokrzyskich i w Beskidach Wschodnich. Północna granica zasięgu gacka szarego w Polsce Centralnej dochodzi do 53° szerokości geograficznej północnej, przebiegając przez: L-ctwo Zielony Bór pow. Słubice — Drezdenko pow. Strzelce Krajeńskie — Słupową pow. Szubin — Ciechocinek pow. Aleksandrów Kujawski — Ciachcin pow. Płock — Zakroczym pow. Nowy Dwór Mazowiecki — Baranów pow. Puławy — Żulice pow. Tomaszów Lubelski. *Plecotus auritus* (Linnaeus, 1758) rozmieszczony jest równomiernie na obszarze całej Polski. W 18 miejscowościach występował on sympatrycznie z *P. austriacus*. Miało to miejsce na: Ziemi Lubuskiej, w Sudetach, na Kujawach, Wyżynie Małopolskiej, Krakowsko-Częstochowskiej i Lubelskiej, Nizinie Mazowieckiej oraz w Beskidach Wschodnich.

PAŃSTWOWE WYDAWNICTWO NAUKOWE * WARSZAWA 1971

Nakład 831+90 egz. Obj. ark. wyd. 8,25. Maszynopis otrzymano 20.I.1971 r. Podpisano do druku 15.IV.1971 r. Druk ukończono w kwietniu 1971 r. Papier: druk. sat. kl. III 80 g. Format B5.

Białostockie Zakłady Graficzne. Zam. 287. Cena 25 zł.