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Argentinian — Polish scientific cooperation in Antarctica (1984—1986)

During the 9th Antarctic Expedition of the Polish Academy of Sciences (1984—1986) interesting contacts were established between the research group working at the Polish "Arctowski" Station and Dr. Rodolfo del Valle, the leader of the Argentinian Station "Jubany — situated about 20 km from the Polish base. Frequent encounters and many discussions resulted in a scientific cooperation in the field of paleolimnology and ecologic research on genesis of Antarctic ornithogenic soils.

The investigations on the effect of breeding colonies of sea birds (mainly of the pygosceid penguins) on the circulation of nutrients in the coastal environment of the King George Island, were initiated by the group, to which belonged authors of the present paper. They were working formerly together within the framework of the 4th Antarctic Expedition of the Polish Academy of Sciences (1979/1980). The results of these investigations proved contrary to the views represented up to now in the ecological literature, that the so-called ornithogenic soils formed in consequence of an intensive organic fertilization constitute a relatively stable element in the Antarctic environment and their lasting is much longer than the period of functioning of the breeding colonies of birds. It has been proved, among other things, that the chemically aggresive solutions formed in consequence of leaching of bird excrements strongly react with the rocky material. In consequence of these reactions a thick deposit of phosphates have been formed with very diversified mineral composition depending both on the chemical composition of the underlaying rock and on the physico-chemical conditions of mineralization processes. At the next stage it was of significance to ascertain, whether the above phenomena would be of more general character and whether the processes of ornithogenic soils formation would run in the similar way in the other places in maritime Antarctica and on the Antarctic Continent as such. On the other hand, a principal aim of the planned paleolimnological investigation was an attempt of reconstraction of geomorphological evolution of the King George Island landscape in the Holocene.

The realization of these plans appeared to be possible thanks to the agreement on the scientific cooperation between Institute of Ecology, Polish Academy of Sciences, and Instituto Antartico Argentino, signed several years ago. In this way the Argentinian-Polish Antarctic expedition was organized.

This expedition consisted of three Argentinians: Dr. Rodolfo del Valle [geologist] and two technical assistants: Ramon Oscar Alfonso and Nestor Villacorta as well as three Poles: Prof. Dr. Andrzej Myrcha (ecologist], Dr. Andrzej Tatur (geochemician] and Stanisław Żdżyłowski [field assistant]. The logistic side of the expedition, including full suppl of transport means, belonged to Dr. Rodolfo del Valle, whereas our group had in its disposal the suitable sampling apparatus and the chemical laboratory. At the next stage also a common working out of the collected samples has been planned. Cores of bottom lake sediments will be examined simultaneously in Poland and Argentina by the group of various specialists.

In the first part of the expedition in question, i.e. in the period from July 14 to August 14, 1985, the cores of bottom sediments were taken from lakes situated in various places of the King George Island [Fig. 1]. They were a large proglacial Rudy Lake in the Three Brothers Hill oasis [near "Jubany" Station] as well as the lakes: Dlinnoe, Kitezh and Hotel on Fildes Peninsula [near "Marsh" and "Bellingshausen" Stations]. The Dlinnoe and Kitezh Lakes are located near the sea from which they are separated by beach raised isostatically to the altitude of 16 m a.s.l. Small Hotel Lake, instead, is located on the central platform at a far distance from the glacier, at c. 45 m a.s.l. We succeeded in taking full cores of the bottom sediments down to the underlying rock from all lakes. Cores appeared to be surprisingly strongly differentiated in lithological respect.

In the second part of the expedition the investigations were carried out on the Antarctic Peninsula, in the region of the Argentinian "Esperanza" Station, situated in the Hope Bay, and on the Seymour Island [West Weddell Sea], where the works were carried out with logistic support of the Argentinian aerial base "Vicecomodoro Marambio" [Fig. 1]. This stage of cooperation lasted from October 16 to November 12, 1985. In the vicinity of the "Esperanza" Station another core was taken from proglacial Boeckella Lake, very strongly enriched due to the occurrence on its western bank of the numerous breeding groups of the Adelie penguins. First of all, however, we concentrated on detailed examination of ornithogenic soils, including the mineral composition of phosphates forming there.

The ornithogenic soils in the Hope Bay oasis occur over a very wide area of a huge rookery of the Adelie penguins, the number of which has been estimated for about 115 thousands breeding couples. This colony investigated three times in the course of the last 40 years, is characterized by a continuous growth of the number of nesting birds. The last estimation was carried out by the British Antarctic Survey in the season 1963/64 when about 75 thousands couples were found there. The penguins in the Hope Bay are nesting on the metamorphized sandstones and graywackes.

On the Seymour Island soil profile were made and numerous samples

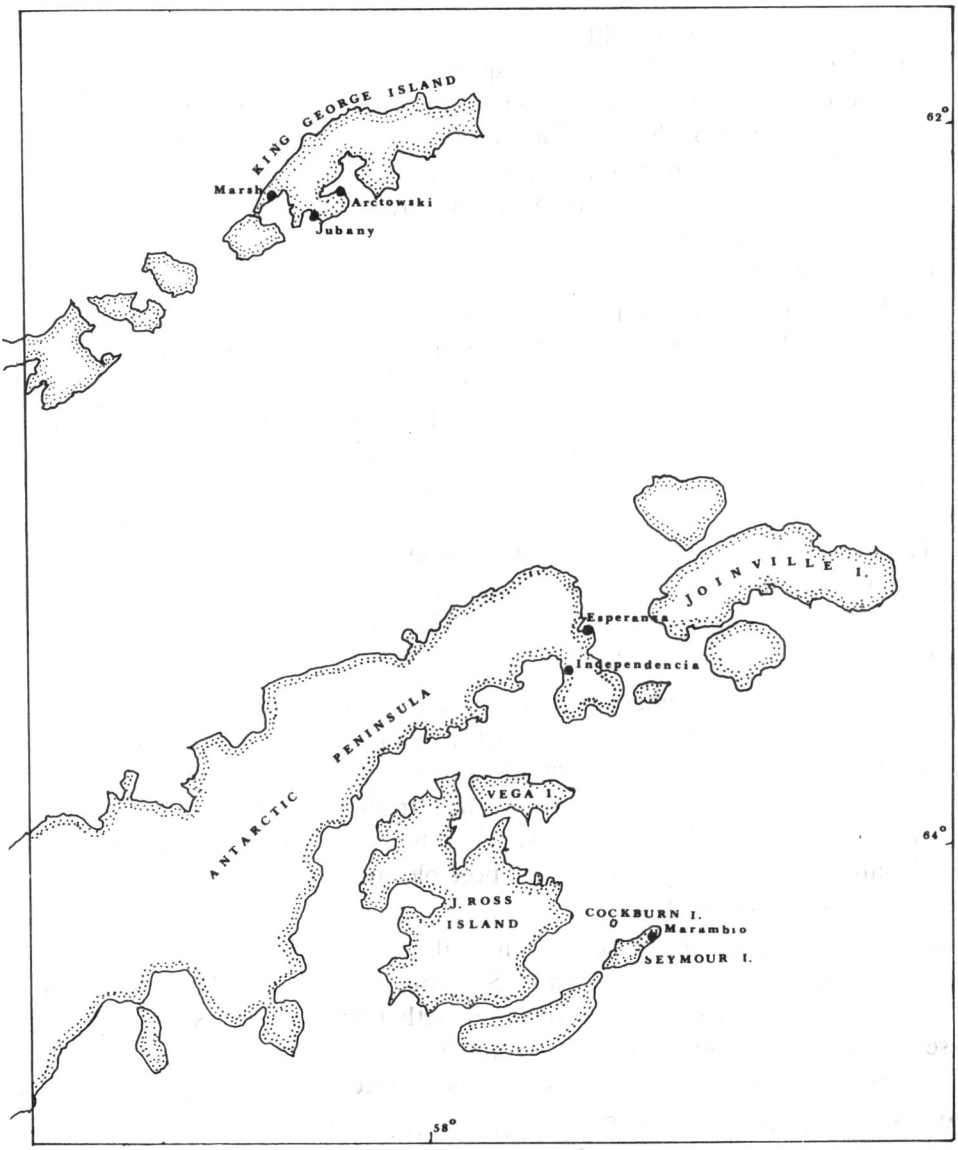

Fig. 1. Localization of Antarctic Stations visited by Argentine — Polish field party.

for detailed chemical investigations were taken in the area of a sole in this region medium-sized breeding colony of the Adelie penguins numbering 21 thousands couples. The number of birds in this colony discovered by the Swedish Nordenskjöld Expedition [1901—1903] was never exactly estimated up to now. The birds are nesting here on quite different rock. It is loose sand interbedded with clays.

Thus one was successful in collection of ornithogenic soil samples forming

under different climatic conditions and on diversified underlaying rock. Of a particular interest is in this respect the colony from the Seymour Island. The climatic conditions predominating there affecting principally the genesis and properties of the soils forming there, are characterized by a much less atmospheric precipitation amounts and by lower air temperatures as compared with areas of maritime Antarctic investigated by us up to now. They are conditions approximating most closely the severe climate of the Antarctic Continent.

Beside the main research program of the expedition as presented above, also several smaller, but interesting tasks were realized. Among other things, numerous samples of rocks from Flora Formation [Mount Flora, Antarctic Peninsula] [Fig. 2], from Troillo Nunatak [Antarctic Peninsula] and from the La Meseta Formation [Seymour Island] were taken [Figs. 3—4]. The age of these rocky sequence is still doubtfull. The collected materials will be worked out by Polish micropaleontologists in cooperation with Dr. Rodolfo del Valle and will contribute to facilitation of establishing more exact stratigraphic position of the above formations and may be also to the reconstruction of the ecologic conditions prevailing during their formation period.

The significant achievement of the expedition constituted also numerous didactical materials in the form of rocks, samples of the petrified fauna and flora as well as contemporary plants collected at different places of the northern part of the Antarctic Peninsula [from Hope Bay to Duse Bay] and on the Seymour Island. They will be also given over to the disposal of paleontologists and botanists for possible use, as they can be also of a certain value as scientific materials.

Interesting achievement of expedition is also a collection of fossil penguin bones from the La Meseta Formation on Seymour Island. Several bone occured "*in situ*" in calcareous sandstones together with many other fossils [Fig. 5]. These bones are coming probably from the same lithostratigraphic level but different area than Swedish and English collections.

We are convinced that the first Argentinian- Polish cooperation was fully successful. It was possible for the Polish scientists for the first time to perform planned systematic investigations on the northern margin of the Antarctic Peninsula and on islands situated at its eastern coasts of the Weddell Sea. The place situated most southwards in this region, which was reached by a part of the expedition participants, was the Argentinian field base located near the Antarctic Circle on the Jason Peninsula, (area of the Larsen's Shelf Glacier).

It is to stress that reaching such positive results as presented above was possible owing to good organization of the expedition, including supply at a proper time of appropriate transport means, what should be acknowledged

Fig. 2. Expedition on the glacier at the foot of Mount Flora (Antarctic Peninsula) on the way from "Esperanza" Station to "Independencia" field base.

Photo by A. Myrcha

Fig. 3. Tertiary calcareous concretions removed from sandy cliff of Seymour Island.

Photo by A. Tatur

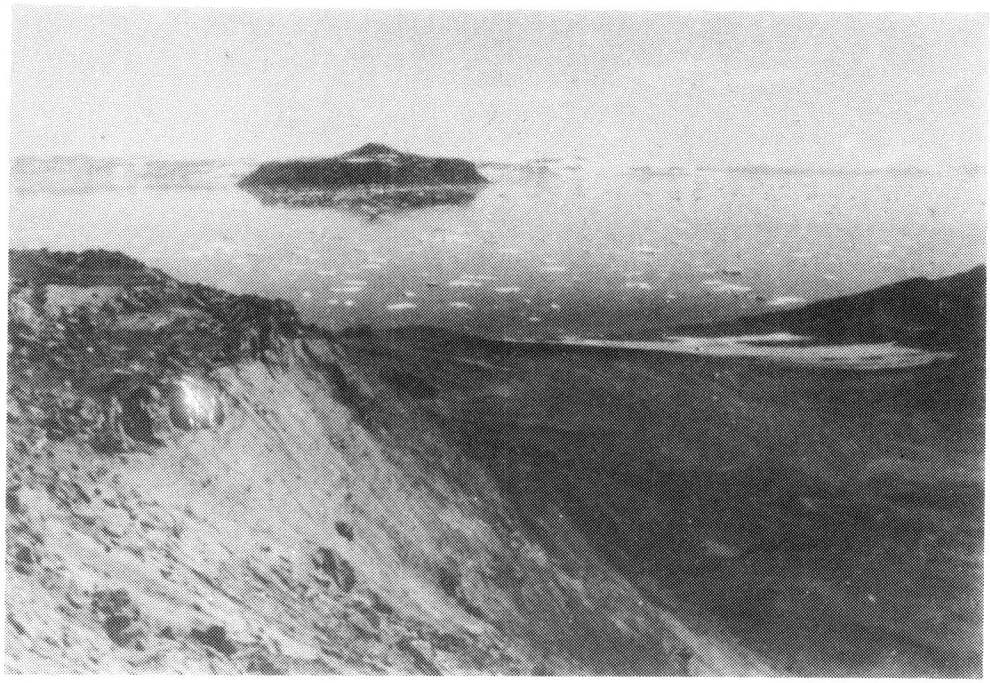

Fig. 4. View from Seymour Island to Cockburn Island.

Photo by A. Tatur

Fig. 5. Fossil bone of penguin and a few bivalves in calcareous sandstone. La Meseta Formation, Seymour Island.

Photo by A. Myrcha

as a merit of Dr. Rodolfo del Valle. To the expedition members snow scooters, rathracks, "Twin Otter" planes and helicopters were available. In three Argentinian bases: "Jubany", "Esperanza" and "Vicecomodoro Marambio" as well as in Chilean Station "Teniente Marsh" we were met with great friendliness and everywhere appropriate work conditions were ensured for us. All that can be regarded as a good perspective for the future Antarctic cooperation of the Polish and Argentinian scientists.

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