THE UKRAINIAN HYDROBIOLOGICAL RESEARCHES IN THE AREA OF THE ARGENTINA ISLANDS
(HYSTORY AND MAIN RESULTS)
S. Ignatyev
IBSS
s-ignat2004@yandex.ru

The Ukraine, as the independent state of the former USSR in 1996 when became as equal member of the modern Antarctic community began to pursue biological researches in the Antarctic Continent. The first Ukrainian Antarctic station (the UAS) Academic Vernadsky became the basic place for these researches. The station (the former Faraday base) was transferred to the Ukrainian Antarctic Center (the UAC) by the British Antarctic Survey (the BAS) on February 07, 1996. This station was first built on the Argentine Islands during the British Graham Land Expedition (1934 - 37). Permanent occupation started in 1947. Now the station is located on Marina Point, Galindez Island (65015'S, 64°16'W).

The location of Argentina Islands Archipelago is unique some kind. It is the meeting-point of the rather warm Southern-American and cold Antarctic waters. The continent is situated at a short distance and blocks up of currents in narrow pipe (some miles wide) of the straits of Lemaier and Penola, still more increasing the high dynamic activity in region (Bulgakov et al., 2001). It causes the heightened biological productivity of environmental waters, that under conditions of vast spacious shoals makes region by the general place of reproduction of krill (Samyshev, 2002), whence he expatriates in the general water body of his distribution area (where, in fact, and takes place his fishing). Besides, the archipelago is natural border of reproductive areas of distribution of many subantarctic and antarctic species that determines the mixed character of fauna and flora of the region. The number of endemic, hardly identified species is significantly. Thus, the taxonomic status of many, even of mass species, is not established.

Despite of long period (since 1947) of the presence in region of stationary scientific base, the biological researches here practically were not carried out. Traditionally "Faraday station" station is operated in the field of Upper Atmosphere and Climate science. Data are collected and analyzed in the framework of the several disciplines: ionosphere, magnetosphere, geomagnetism, meteorology, glaciology and ozone researches. According to the Memorandum of Understanding between the UAC and the BAS the Ukrainian scientists continue and supply the BAS with long-term measurements of total ozone, magnetic, meteo- and ionosonde data.

Undertaken by British Antarctic Survey in middle of 60-th years the attempt to make the biological description of Islands of the archipelago was reduced to revision of their ground flora and not numerous observations over seals. Biological researches were begun only in 1997. At present the biologists work at the station already during five winter seasons. It allows spending long-term monitoring of many components of the ticecosystems. The biological researches were conducted in the following strategic directions: (1) Monitoring of the ecological condition of the sea ecosystems at all levels from microplankton up to whales. (2) Estimation of the condition of living resources, first of all krill Euphausia superba. (3) Estimation of the influence of anthropogenic factors (different types of pollution and frightening factor of human presence). (4) Biology of separate mass animal species - krill, fishes, skuas, penguins.

The complex hydrobiological researches (Institute of Biology of the Southern Seas NASU) in region of the Ukrainian Antarctic Station "Academic Vernadsky" are begun during the 2-nd wintering (March 1998) and are continued during the 7-th wintering (2002-2003). These researches have proved an opportunity of high-quality realization of the complex ecological monitoring of marine environment in conditions of UAS "Academic Vernadsky".

The main results are based on results of processing of biological collections which has been gathered in the 7-th UAE by IBSS senior scientist Sergey M. Ignatyev (2002-2003). These results allow estimating of a species background of the general components of the biota, quantitative characteristics of their distribution and their seasonal variability. It allows receiving a starting point for the subsequent researches with the purpose of revealing of trends of variability and study of features of their functioning.

PHYTOPLANKTON (Ludmila Kuzmenko. IBSS). The analysis of phytoplankton samples, collected in the 7-th UAE, has shown, that within water area of islands of the Argentina Archipelago the microalgae is presented by 159 species. At that the distinct seasonal dynamics of qualitative composition and quantitative development of phytoplankton is observed. Number and biomass of phytoplankton were minimal during the Antarctic winter (0.09 million cells and 0,11 mg.m-3 in July, 2002 accordingly). The number of phytoplankton developed at the expense of small flagellates and small species of diatom algae. A basis of biomass created the rather large diatom algae, their number was insignificant. Since April till July the specific composition of vegetative plankton was extraordinarily poor (no more than 10-20 species and varieties in one sample) and practically monotonous between an islands of the archipelago. Phytoplankton is presented by the littoral benthic pennats diatom algae from genera Licmophora, Achnanthes, Fragilariopsis, Navicula, Nitzschia and the combined group of small flagellates. Only with inflow of oceanic waters in northern part of the Meek Channel in plankton the pure oceanic species of very large diatom algae from genera Odontella, Thalassiothrix, Rhizosolenia, Corethron was displayed and their biomass achieved 584 mg.m-3. In the beginning of antarctic spring (September) in samples of phytoplankton the aggregates of prASSESive algae (Phaocystis pouchetti) of small dimensions with the number amounted to 70 millions cells.m-3 have begun to occur. In October the quantity this algae has increased considerably (77-108 milliards cells.m-3 or 95 % of total number of cells in phytoplankton), that has caused the phenomena "the blooming of water". Biomass was still determined by quantity of large species of diatom algae from genera Coscinodiscus, Odontella, Eucampia, Thalassiodia, Asteromphalus, Corethron and aggregates of Fragilariopsis sp.
KRILL (Ernest Samyshev and Sergey Ignatyev IBSS). In water area of region of the UAS "Academic Vernadsky" in fact krill was presented by one species (Euphausia superba). Two other species of euphausiids (Thysanoessa macrura and E. triacantha was occured extremely rarely and by single individuals. E. superba is presenting at waters near the UAS all-the-year-round. In the spring (November - December) the “scattered” krill is presented by small juvenile crustaceans and a basis of aggregations is formed by large mature individuals which was ready to reproduction. In the autumn (April - May), on the contrary, small and large immature crustaceans form the basis of aggregations, while large mature krill occurs as single animals near the edge of the ice or icebergs. The compound aggregations with predominance of individuals of small dimensions are characteristic for summer. The number of krill in aggregations makes from 4 to 11 ind.m-3, and average biomass varies from 480 mg.m-3 in the spring and 2000 mg.m-3 in autumn. During one year the number of single krill is practically constant and makes up 2-4 ind.m-2. The consumption of feed by krill is high during all the year round, the nutrition realizes by phytoplankton mainly, except for early spring (September - October), when the role of detritus component is high. The distinctions in dimensional structure and feature of behavior allow assuming that two groupings of krill exist in the region.

FISH (Sergey Ignatyev IBSS). In area of the UAS the 8 species of fishes from 2 families are identified. The 7 species relate to family of Notothenia. According to frequency of occurrence the large foreheading (green) Notothenia coriiceps (71%) absolutely dominates, on the second place is situated the trematomus - the gay (Trematomus bernacchii) (17 %) and the messenger (Trematomus newnesi) (7 %). All species conduct the ground or near-ground-pelagic modes of living. In conformity with character of their feeding the majority of species of fishes are the predators-benthophages, the crustaceans (amphipods and isopods) make up the basis of their food, and also algae and mollusks. The share of krill in their ration does not exceed 3%. The data on seasonal changes of feeding and reproduction of mass species of fishes in model region are received.

SEA BIRDS AND MAMMALIANS (Sergey Ignatyev IBSS). During the 7-th UAE (2002-2003) in area the UAS "Academic Vernadsky" is marked the 19 species of sea birds and the 7 species of mammalians. By the oral messages of others winterers, the enough expressed stability of structure is peculiar for ornithofauna of region during different years, the fluctuations of a specie diversity is defined by occurrence of species of the seaway or drift of accidental species of birds for the region. In 2002-2003 for the first time is carried out the integrate nests account of Gentoo Penguin (Pygoscells papua); the statistically established data on seasonal changes of the number and the success of reproduction of this mass specie are received. The high reproductive success (with coefficient in 1.15-1.68) of Gentoo during the first year of living is marked. The new researches of genetic and population structure of Gentoo penguins (P. papua) and McCormick’s skuas (Stercorarius maccormicki) began in 1998 - 2002 (Vladimir Bezrukov, Kiev University). The first biological researches in the poorly investigated region have showed an opportunity of worthy participation of the Ukraine in the international Antarctic projects.