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STAT

KARAVAYEVO SOVKHOZ

Professor A.A. Kudryavtsev

A.V. Kuz'michev

To take facts from life, to make generalizations from them and on the basis of these generalizations to actively influence nature, to channel it in the necessary direction -- such is the method of work of Soviet biologists following the path shown them by the great Russian scholar, Ivan Vladimirovich Michurin. Fulfilling the legacy of this highly gifted transformer of nature, senior zootechnician at the Karavayevo Sovkhoz in Kostrom Oblast, Stanislav Ivanovich Shteyman, Hero of Socialist Labor, Stalin Prize winner, made outstanding achievements.

One fall evening in 1931 a shepherd at Karayevo Sovkhoz told Zootechnician S.I. Shteyman that a pregnant cow had left the milk herd when they were out to pasture. She was found in a spruce thicket after eight days. A healthy, strong calf was running about beside her.

S.I. Shteyman gave his attention to the unusual occurrence of the calving of a cow in the cold. Previously, the sovkhoz cows had calved only in warm buildings. And still, despite careful nursing, the cows had frequently been sick and many newly born calves had died.

After this occurrence S.I. Shteyman decided that the methods adopted in the sovkhoz for handling calving cows were unsatisfactory: they make the cows animals soft, they cause them to be short-lived, to be flabby and predisposed to sickness. To harden the organism of the cattle he proposed that ~~they give birth to~~ the calves be raised in unheated buildings and that they be given no assistance in birth except in

cases of obvious necessity.

The widespread practice in West Europe of making cattle soft led to the high incidence of disease among them. In connection with this, bourgeois "scholars" had worked out a stupid theory on the unavoidability of such diseases as tuberculosis and brucellosis in highly productive herds. To get rid of these diseases it was proposed that the productivity of the herd be reduced. The Soviet zootechnician S.I. Shteyman vigorously opposed such "theories". The cattle must be hardened to the cold, their viability must be increased -- such was his new rule.

Newborn cattle, emerging from the plus 38 to 39 degree temperature within the body of the mother into a low temperature (to minus 10 degrees), were forced to work out a corresponding reaction in response to this temperature change. The thresholds of reaction by the bodies of these cattle ~~were higher~~ hardened under steam raised than those in cattle ~~born~~ at outside temperatures of 15 to 20 degrees. And the higher the reaction of the body, the greater the viability of the animal. Interplaying with the various external factors, it became stronger, more adapted. In addition, as practice showed, giving birth to calves in unheated buildings exerted a positive effect on their offspring, too.

All of these facts were new proof of the proposition that the life of the organism and its development are inseparably bound with environment and that the traits acquired by the organism in its lifetime are passed on to its offspring.

Life confirmed that in the calf born in the cold all the organs work more perfectly, the metabolism in the organism goes on better and, consequently, fodder is used more economically. From this, still

another important deduction was made: that the food value of the fodder changes depending on the circumstances of its use by the living organism. The same ration produced varying results: feeding in heated buildings led to the death of many calves, while feeding in unheated buildings caused great viability in the calves and led to an increase in their weight, to better development of all their organs and to the highest productivity of the animals.

Previously, calves at Karavayevo Sovkhoz had been fed 560 and more kilograms of whole milk and more than 1,000 kilograms of skimmed milk. Despite this, there was a considerable loss of calves. This happened because the calves were kept in heated buildings where the temperature, as a rule, fluctuated and the air was moist and contaminated with ammonia fumes. Such conditions did not increase but reduced the viability of the organism. After this, when they began to calve the cows in unheated buildings the results changed sharply. They put the calves in separate stalls with plenty of straw bedding. Thanks to this, the temperature of the air in the stalls in winter was usually considerably higher than it was out of doors. The milk ration norm for calves who had been born in unheated buildings was reduced considerably. For the winter the calves received an average of 400 kilograms of whole and 1,500 to 1,800 kilograms of skimmed milk. As a result, cases of death of calves were wiped out completely on the farm and their growth and development improved. Along with this the sovkhoz got the chance to economize annually on a large amount of fodder and fuel. Less workers were needed to care for the calves.

The herd at Karavayevo Sovkhoz is being improved in many ways. These improvements include the following: plentiful and rich feeding of the animals, painstaking care of them, hardening the organism of

the calves, proper use of the animals corresponding to their period of productivity, and, finally, selective breeding in order to obtain desirable offspring.

Candidate of Agricultural Sciences, N.F. Rostovtsev, worked out indexes of productivity for 100 animals in the Karavayevo herd which were born at the same time of year. It turned out that the animals born in the winter months grew better than those born in the summer. Cows which had been born in the winter weighed at the time of their first calving 32 kilograms more than those which had been born in summer. Cows born in the winter gave 265 kilograms more milk at their first lactation than those born in the summer. While the productivity of cows born in the summer amounted to 3,951 kilograms for three lactations and fat content of the milk amounted to 3.76 to 3.81 percent, the average productivity of winter cows was 6,500 kilograms and the fat content of the milk 3.7 to 3.85 percent.

Making an autopsy of several fatlings, N.F. Rostovtsev established that animals born in the winter weighed 12 percent more, the hide weighed 19.3 percent more, the liver 8.3 percent more, the heart 41.4 percent more, the lungs 37 percent more and the kidneys 38 percent more than those of summer cows.

The physiological laboratory at the All-Union Institute of Experimental Veterinary Medicine, doing research on the indexes of the work of the heart, lungs, and digestive system, established that the indexes for animals from the Karavayevo herd far excelled the same indexes of other herds which gave less milk.

Karavayevo Sovkhoz has, for many years in succession, been achieving the highest indexes for the milk productivity of its herd.

Formerly, cows which gave 3,000 kilograms of milk per year for eight to ten years were considered very fine. In all, they gave 24 to 30 thousand kilograms of milk. The yield of milk at Karavayevo has been increased four to five times. Every year there is an increase in the number of cows at the sovkhoz, from which the farm receives 110,000 kilograms and more of milk.

Karavayevo has established many records for the productivity of its cattle. For example, Poslushnitsa the Second has given in one year over 16,000 kilograms of milk with a fat content of 3.92 percent. The higher daily milkings of individual cows exceed 60 kilograms. It is remarkable that the record cows give high yields not only in one lactation but over a period of 18 to 20 years.

Karavayevo managed to solve many problems on which foreign scholars had worked without success. The cows of the Karavayevo herd give record quantities of milk with a high fat content, a thing which had been considered impossible. For example, the widespread ostfrizskaya (All-Union Standard Friesian) breed of big-horn cattle is reknowned for its high yields of milk but the fat content of the milk from these cows is only 3 to 3.4 percent. Cows of the Kostrom breed, whose milk productivity far exceeds that of the ostfrizskiye, have an average fat content of 3.7 percent in their milk. The fat content of the milk of indivudual cows at Karavayevo amounts to 4.67 percent with yields of over 10,000 kilograms for 300 days of lactation.

In the not-too-distant past it was thought, too, that high milk productivity and fine qudity meat must not be combined. Experiments in perfecting cattle of the Kostrom breed refute this conviction as well. Usually the yield of meat from the slaughter of cows of special meat breeds was considered good if it amounted to 54 to 56 percent; but

in Karavayevo cows which have been rejected from the milk herd the yield of meat amounted to more than 60 percent. Their meat is distinguished by being highly tasty, tender, and of a high caloric content.

With every passing year there is an increase at Karavayevo in the number of cows which give large quantities of milk distinguished by its high fat content, and their productivity and the period of time they can be used by the farm increases steadily. At present individual cows at Karavayevo and its herd as a whole hold first place in the world for yield of milk and fat content. Such are the results of using the progressive methods of caring for animals, methods worked out in the sovkhoz on the basis of Michurin's teaching.

The principal activity of the workers of the sovkhoz at present is the breeding and perfection of pedigreed cattle. Every year hundreds of calves of the new Kostrom breed are exported to the sovkhozes and kolkhozes of the country. Much valuable experience has been amassed in the work of the sovkhoz workers and is being mastered by the cattle raisers of our country. This experience helps them to fight to overfulfill the Three-Year Plan for the development of public cattle-raising.

The Party and the Government have praised the achievements of the workers and specialists at Karavayevo highly. More than 30 workers at the sovkhoz have received the important title of Hero of Socialist Labor for outstanding achievements in the field of cattle-raising. Inspired by the high praise of what they have accomplished, the workers of the sovkhoz continue their successful labors to perfect the best milk herd in the world.

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SCIENCE IN THE KOLKHOZ FIELDS

Photo: N. Pashina

P. I. Azhirkov, Hero of Socialist Labor,
Chairman of Borets Kolkhoz, Bronnitskiy Rayon
Moscow Oblast'

Much could be written about how the Borets Kolkhoz became a progressive socialist farm, how we are getting high, stable harvests, how the productivity of public cattle-raising is steadily increasing. The history of our kolkhoz clearly reflects the successes of all ~~of its~~ kolkhoz peasants.

We live and work under Stalin's Statute for Agricultural Artels; we use our manpower skillfully; we use the newest achievements of agronomic science and technology in our fields.

Achieving high yields, the Borets Kolkhoz settles with the government completely and on time; it sets up all the public funds provided for by the Statute; it pays the kolkhoz workers a high daily wage; it invests additional funds in the public economy.

The enlarging of our kolkhoz last year opened up new possibilities for increasing the productivity of labor and obtaining high yields. The enlarging of the kolkhoz is enabling us to use the newest technics and the latest achievements of Michurinist science in our fields.

Borets has been a steady participant in All-Union Agricultural Exhibitions. Brigade Leader N. A. Kostrichkin, squad members A.N. Sitnova, K. M. Frolova and I, received the important title of Hero of Socialist Labor in 1947 and 1948 for the outstanding successes

of our agricultural artel. More than 250 male and female kolkhoz workers have received government prizes -- medals and orders.

Photograph of author of article

P. I. Azhirkov

In 1950 we obtained high yields on all the lands of the Kolkhoz and not on individual record areas. For example, in the area of the third field brigade led by Comrade Mukhin we gathered from each hectare of plowed land 27.34 centners of rye, 30.90 centners of winter wheat, 26.54 centners of spring wheat, and 28.28 centners of oats. It is characteristic that a good yield was obtained simultaneously in four crops grown in different fields under crop rotation with varying preceding crops. The yield gathered by this brigade is not a record one. Another brigade headed by Comrade Zavalov received 31.73 centners of spring wheat from each hectare.

Why has the yield at our kolkhoz increased? Most of all because of the elaborate care given the sowings and the introduction of progressive science and technics into the practice of socialist agriculture.

The source of kolkhoz wealth, the basis of its prosperity is the land. The development of all branches of agricultural production depends on the proper use of the land. We place great importance on the methods of using the lands and the system of working them over. All of our lands are plowed under in the fall to a depth of 20 to 22 centimeters by plows with coulters. In many areas, after the harvesting, we plow the stubble under with disc plows for shallow plowing.

In the spring, after the sowing, we cultivate.

Pictures on page 10 of text

House of agricultural culture at Borets Kolkhoz

Reading room in the kolkhoz library

Plowing under winter-crop fields

The introduction of the field grass crop rotation system has played an important role in improving the use of kolkhoz land. Since 1938 we have mastered the proper crop rotation by sowing with perennial grasses. The sowing of mixtures of leguminous and cereal grasses in the fields undergoing crop rotation and the proper rotation of all crops is the basis for creating a very rich soil. Each field in our crop rotation goes through a fallow period and a period in which it is sown with perennial grasses. During the fallow period of the field the soil is cleaned of weeds. The sowing of perennial grasses is the best method for making the structure of the soil nodular. This as is known, is an important factor for very rich soil.

Experience has shown the advantage of many sowings of grasses. No less care is required for perennial than for other crops. Manure must be put on the field and nourishment supplied in the form of super-phosphates and calcium chloride. Progressive agrotechnics helped the kolkhoz to achieve marked increases in the yield of perennial grasses. The 1949 sowing of an area of 35 hectares resulted in an average yield of 75 centners of hay per hectare for two harvests.

We are giving much attention to the creation of a firm and stable fodder base for cattle-raising. On the basis of Michurinist

agrobiology the kolkhoz is increasing the varieties of fodder crops. In 1950 we conducted experiments in cultivating 21 crops of 36 varieties under local conditions. For the most part these came from the south: sorghum, Sudan grass, Japanese millet, corn, dagussa [Eleusine indica], and others. "Severyane" [northern crops], such as annual rye grass and horse beans were also tested. The last two crops plus amaranth seemed especially good prospects. They gave a good harvest and in taste were better fodders for the cattle. The yield of green forage from amaranth and horse beans amounted to more than 40 tons per hectare.

Along with the introduction of field grass crop rotation we are increasing the use of fertilizers. Fertilizer is the real source of a rich harvest. Manure is the best kind of fertilizer. We take the bulk of the manure out to the field in the winter time and pile it in large 50-ton heaps, composting it with phosphate fertilizer. Along with the organic fertilizers the kolkhoz uses a large quantity of mineral fertilizers on its fields.

An important place is given to seed cultivation among the many agrotechnical measures adopted in our kolkhoz. As you sow, so shall you reap, says our proverb, and justly so. All the fields of the kolkhoz are sown with the best regionally distributed varieties. We sort the seeds well, clean them, and carefully try to observe the sowing norms.

Every year new varieties of agricultural crops introduced by Soviet scientists and progressive agronomists are tested in our fields. The fields of our kolkhoz were turned into an unusual laboratory of Michurinist science and advanced experimentation.

Without a doubt, the proper crop rotation, varieties of seeds, skillful working over of the soil are the chief factors in getting high yields. But this is not enough. To be completely successful in our business, we must give care to the plants, fight against diseases and pests which do harm to the crops, and finally, we must perform all operations on time and especially not be late in gathering the harvest.

The use of these agrotechnical measures became possible only on the basis of wide-scale mechanization of socialist agriculture. Tractors, combines, sowers, harvesters, automobiles, the use of electricity have made the work of the kolkhoz workers easier. With the help of the MTS we mastered new lands, provided for the deepening of the arable layer, etc. We have organized strict control of the work of the tractor drivers. We are getting such work from the MTS as meets the needs of advanced agrotechnics. No small number of new machines has been designed recently by Soviet engineers and designers for the mechanization of various kinds of agricultural operations. The use of these machines is a great help to us in increasing the richness of the soil and the yield.

Our kolkhoz obtained high and stable yields from almost all crops. Take spring wheat, for example. Many kolkhozes in our district consider spring wheat a poor crop and avoid planting it. There was a time when the harvests of spring wheat at our kolkhoz amounted to 3 to 6 centners. But later we learned how to grow it and began to get up to 30 centners per hectare.

How did we achieve such results? It is usually recommended that spring wheat be sown after perennial grasses. Our results with

this were poor. But when we tried it after vegetables, the yield of spring wheat was considerably higher.

Spring wheat was sown after potatoes, which were fertilized well and gave a high yield. The area, as well as the whole field, was plowed in the fall to a depth of 22 to 23 centimeters. In the spring as soon as there was a chance to go into the field, we cultivated it and then sowed it.

For the spring wheat we used only mineral fertilizers: a half centner of ammonia nitrate and a centner each of superphosphates and calcium chloride for each hectare. We did not use manure because we had fertilized the field with it sufficiently in 1949 when sowing the preceding crop.

Spring wheat is seriously harmed by the Swedish fly, which appears in the 20's of May. But the fly harms the plants only when they are young. From this we drew the conclusion that we must sow the spring wheat earlier so that at the time the fly appears the wheat will have managed to grow and gain strength.

Besides this, chemistry can be of great help in combatting the Swedish fly. Last year experiments were conducted at the kolkhoz to dust the spring wheat with hexachloran, after which the yield increased almost two and a half times. Now dusting will be compulsory for protecting the sowing of spring wheat against injury by the Swedish fly.

The spring wheat is being sown with a narrow seed drill. The distance between the shares is 9 centimeters, less than in other drills. As experience has shown, narrow seed drilling has greater

advantages because the seeds are distributed in the soil evenly, a factor which is especially important in the case of spring wheat.

At present we are sowing one variety of spring wheat -- "Moskovka" -- which is at this time the only reliable variety of spring wheat, adapted to the conditions of our district. But we are sure that in the near future our ~~scholars~~ scientists will find new valuable varieties of spring wheat through hybridization, varieties which can resist diseases and insect pests and which possess good flour-making and breadbaking qualities. The kolkhoz workers are awaiting with great interest the results of the work of Soviet scholars ~~to produce an altogether~~ scientists on the creation of a completely new wheat, a perennial, the yield of which after one sowing can be gathered for 2 to 3 years. Thus, combining the achievements of Michurinist agrobiology and the advanced experimentation of the kolkhoz workers, the nature of plants can be perfected without limit and the yield increased.

Nor does the public stock-raising of our kolkhoz lag behind plant cultivation in its many-sidedness and productivity. As in plant cultivation, so here too we have built on strictly scientific principles.

Our farms have model buildings. The stockyards are equipped with water supply systems, automatic watering equipment, electric lighting. Manure is carried by trucks which travel on rails ~~[locomobiles]~~ running down the middle of the stockyard. Water is ~~gotten by~~ supplied by means of an electric motor. Silos and buildings for storing fodder have been built ~~as adjuncts~~ next to of the stockyard. The stock are fed

rations prescribed by the kolkhoz zootechnician.

The kolkhoz began to improve its breeds of stock at the very outset, and today all of ours are pedigreed. Using advanced scientific methods of stock-raising improving the preparation of feeds, from year to year we have increased the output of our animal husbandry. Last year the amount of milk for each fodder cow amounted to 3,436 kilograms, pig littering was 16 per sow, the amount of wool shorn was 3,300 grams per sheep.

Broad possibilities in the development of productive stock-raising are being opened up by the innovators of kolkhoz production. Excellent results have been obtained at our kolkhoz by milkmaid A. A. Kashkina. She has been working on our farm for 5 years. Through her, 8 cows have been strengthened. One of them, "Lin'ka", gave 7,786 kilograms of milk last year. On separate days the yield from this cow amounted to 60 liters.

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The laboratory cottage is of great help to the kolkhoz workers in their fight for high yields. Lab worker L. F. Petrova is checking the germination of seeds (at left), determining their purity (center), and controlling the condition of the winter wheat sowings (at right)

Pictures on page 12 of text

Agronomist S.M. Skornyakov (left) and granaryman G.F. Gusev check the condition of the seeds at the granary.

At the House of Agricultural Culture samples of plants grown

in the fields of the kolkhoz in 1950 are exhibited.

Speaking recently to young milkmaids, A. A. Kashkina told how she used scientific data and the experience of progressive stock-raising in her work. First of all, she set up a strict diet for high milk-producing cows and good and abundant feeding. The ration of feed for each cow includes up to 50 kilograms of plants with edible roots, 25 kilograms of silage, 10 kilograms of concentrates, and 6 kilograms of hay. Chalk and bone meal are added to the concentrates. A salt lick and automatic water supply are set up in the cow's trough.

Of course, such an amount of coarse and succulent feeds must not be given to the cows at once. The ration was increased gradually by training the organism over a period of three years.

The achievements of innovators of production and advance Michurinist science are proof of the fact that the possibilities of increasing the productivity of stock-raising are inexhaustible.

The enlarging of the kolkhozes set up conditions for the further improvement of socialist agriculture. In conjunction with this enlargement and new progress by kolkhoz production, the Party and the Government presented us with many responsible tasks. A vitally important task is to strengthen the bond between science and practice to study the contemporary achievements of Soviet agronomic science and the experience of advance workers and introduce them into production.

Our kolkhoz is maintaining close ties with the seientific research institutes and institutions in Moscow and the oblast.

We often have scholars at the kolkhoz; they give lectures to the workers and help solve many problems. Professor Pisarev, who discovered "Moskovka" wheat, gave a lecture at the kolkhoz club on"The Agrotechnics of Spring Grain Crops". Professor Karpinskiy gave one on soils and fertilizers. Candidates of Agricultural Sciences Tyulin, Rodionov, and Belyaev gave lectures to the active of the kolkhoz on the system of fertilizers, the yield of perennial grasses, the fight against weeds through chemical methods etc. We profited greatly from these lectures.

The center of propaganda on agricultural knowledge and wide-scale experimental research work at Borets Kolkhoz is the House of Agricultural Culture. Here there are microscopes, books on various problems of agriculture and cattle-raising, and filmoscopes.

Since 1950, in both our kolkhoz and others, three-year agrozootechnical courses which are not separated from practice have begun to operate. The kolkhoz workers show much interest in these studies. They try to put their learning into practice.

With every passing day the kolkhoz workers grow more convinced that only on the basis of the use of the achievements of Soviet science and advanced experimentation can new successes be made in the fight for a still greater improvement in socialist agriculture.

Zh 6,44 19-21

The Development of I. N. Pavlov's Ideas

THE INFLUENCE OF ENVIRONMENT ON NERVE ACTIVITY

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Drawings by N. Smol'yaninova

The basic features of Soviet physiology are nervism and evolution. They characterize the original and singular course of the physiology of the fatherland, the founders of which were the great Russian scholars, I. M. Sechenov and I. P. Pavlov. They were the first to throw scientific light upon and work out problems on the influence of environment on the organism and on the establishment of higher nerve activity.

As is known, Darwin at first did not place great importance on the direct influence of environment on the evolution of organisms. And only afterwards, in 1867, in one of his letters did he acknowledge it: "My greatest mistake was the fact that I underestimated the direct influence of environment on the organism, that its, the influence of climate, food, etc., independently of the influence of natural selection."

Long before Darwin, the outstanding Russian evolutionist, A. Kaverznev, learned to give full value to the role of the effect of environment on the evolution of the organism. But an especially important discovery along this line was made by I. M. Sechenov. He introduced into the "scientific determination" of the organism the influence of the environment, the unbreakable bond between the development of the organism and external factors. With this he

opened wide scientific horizons for research on the evolution of functions in general and the evolution of higher nervous activity in particular. The fundamental propositions for this problem, which is still as important in our day were formulated in an amazingly clear and profound manner by I. M. Sechenov in 1878.

"Comparative study of animals", he wrote, "shows....that the progress of material organization and life does not go in straight lines but branches, going off on sidetracks in places. Here, on these sidetracks, the influence of the environment in which the organism lives on that organism, or, to be more precise, the conditions of its existence, tells on the organism with particular force....External influences are not only necessary for life but are at the same time factors capable of altering the material organization and the nature of life courses....Everywhere and always life consists of the cooperation of two factors -- determined but changing organization and the effects of environment....A further factor in the successive evolution of the animal organism is, as is known, heredity -- the ability to transfer to one's offspring the changes acquired in the course of an individual life."

Thus I. M. Sechenov through his teachings on the oneness of environment and the organism added considerably to and developed Darwin's teachings on adaptation.

[Picture on page 19 of text:]

I. M. Sechenov

I. P. Pavlov, even in the very beginnings of the studies which he developed, pointed to their broad evolutionary-biological basis and more than once emphasized the tie between his studies and Darwinism. Expressing his opinions on the evolution of higher nerve activity, I. P. Pavlov proved that the physiological mechanism with the help of which the animal adapts himself to his environment is the conditioned reflex.

Acknowledging together with I. M. Sechenov the fact that certain acquired conditioned reflexes are reinforced by heredity, I. P. Pavlov made the mechanisms of the adaptation and evolution of the animal organism concrete and through this, on his part, added to and developed Darwinism.

Academician K. M. Bykov, in a report at the joint session of the Academy of Sciences USSR and the Academy of Medical Sciences USSR devoted to problems of the physiological teachings of I. P. Pavlov, noted the following in the section called "The Teachings of Pavlov on Higher Nerve Activity and the Problems of Ecological Physiology": "The teachings of I. P. Pavlov radically affected even the general biological problems of the evolution of physiological functions. For a long time our outstanding biologists have given his teachings attention and have used his ideas and projects in their works."

In recent years the study of ecological problems began to acquire a systematic character in conjunction with the research in the laboratories of K. M. Bykov on the problems of metabolism, heat regulation, feeding, etc., and with the comparative physiological study of higher nerve activity being done by many of the associates working with me.

Our laboratory, which has started research on the comparative physiology of conditioned reflexes, is carefully studying the role of environment in the establishment of higher nerve activity. A useful step in the study was parallel research on animals which are the same in organization [special] but have different environments. Thus, we experiment on such pairs as hares and rabbits, wild and domesticated ducks, hens and partridges, raccoon-dogs and domesticated dogs. Expanding on the types of animals studied, we select those whose natural surroundings and conditions of living are especially typical in their influence on the organism. For this reason we study birds of prey, river beavers, etc.

The ecology of conditioned reflexes proved a difficult subject of research. But even the first results we obtained show how important this field of science is for comparative physiology.

[Pictures on page 20 of text:]

I. P. Pavlov

[right] The stimulus (ammonia) has different effects on the respiratory movements of the kestrel and the partridge.

The first thing we established is the different effect of stimuli on different animals or of different kinds of stimuli on the same animal. For example, ammonia affected the respiratory movements of the partridge and the kestrel in a completely different way. In the kestrel it invariably evoked an obvious depression of respiratory movements. At the same time the curve for the respiratory movements of the partridge remained absolutely unchanged. This can be explained from an ecological point of view. The partridge, a

grain-eater, relies much upon its sight. But the kestrel, a bird of prey which eats carrion, uses its olfactory organs to a great extent; hence, in him, these organs were quite sensitive to the ammonia.

Interesting results were obtained in a study of unconditioned reflexes of the hearts of wild aquatic birds. The following sound stimuli, different in form but of the same type, were used: crackling (breaking ~~a splinter~~ of a wooden chip), the splash of water, a faint whistle, a bell. Experiments on teal ducks showed that there was no heart reaction to the crackle and the bell. The normal heart pulsations of 176 per minute changed to 142 at the sound of the crackling and 171 at the sound of the bell. When the water splashed the number of pulsations rose to 290 per minute, and at the sound of the whistle it reached 250.

The quickening of the heart-beat is explained, evidently, by the fact that the splash of water and the whistle, like the noise of the wings of a swooping bird of prey, are sounds which approximate the stimuli which the animal is constantly coming up against in his life. Similar results were obtained recently in experiments on hares.

Only after many experiments was it possible to find a stimulus which steadily changed the curve of [produced a steady change in?] the respiratory movements of the frog. This stimulus was the pouring of water on the head of the frog. The connection between such a reflex and naturally holding the breath when diving is obvious. The reflex of the retarding of the heart rate acted the same way in other diving animals (ducks, beavers) when their heads were put in water. At the same time, in animals for whom the same stimulus was

e. g., the raccoon, the response was a quickening of the heart rate.

From these observations we drew the following principles. In comparative physiological research the proper election of stimuli for the establishment of the conditioned reflex is of great importance. The physical or chemical properties of the stimuli do not in themselves determine the nature of the reaction to it. The latter depends entirely on the physiological significance of the stimulus. The proper selection of the stimulus is determined by the relations between the given animal and its environment.

Depending on the ecological peculiarities of the environment, the animal for the most part uses different forms of receptivity in adaptative functions. This is confirmed, for example, by the lack of differentiation under olfactory stimuli between the partridge and the hen and the very intense reaction to them by the kestrel. Hence, different animals, depending on their habitat, for the most part use certain sense organs and only secondarily use others. In different animals these principal sense organs are different: in some, sight, in others, olfactory and auditory etc. For example, for the hare the chief ~~sense organs were~~ analysors is the auditory, with sight and olfactory analysors coming second.

[Pictures on page 21 of text:]

[left] In studying the unconditioned reflexes of the heart of the teal it was established that stimuli which differ in form but are the same in type evoke a different number of heart contractions.

[right] The reflex which retards the heart rate comes into play when water is poured over the frog's head.

Important facts were obtained recently in observations of wild ducks. Our object was to find the stimuli which would affect their olfactory organs, recording their reactions precisely by means of a curve of their respiratory reactions. Many stimuli were tried: turpentine, pitch, ether, ammonia, and others. However, no reaction was observed and we were all ready to conclude that wild ducks lacked olfactory sensitivity. How surprised we were when the use of rosemary evoked a distinct change in the respiratory movements. It turned out, as a zoologist who studied birds explained to us, that during migration these ducks feed on grass which has rosemary in it.

Here we have touched upon just a few of the problems which arose in connection with the ecological line of our research. Many of them are of broad, principle significance which is outside the realm of comparative physiological research and helps us in many cases to properly organize observations of higher nerve activity in man.

I will cite two instances. We had a patient in whom we could not, because of severe weakening of cortex activity, evoke a conditioned reflex at the sound of a metronome and the flashing of a light bulb. Then we used the odor of perfume as a conditioned stimulus. In using this idea we became acquainted with the kind of life, tastes, and other habits of the patient before his illness. The conditioned reflex under these circumstances was set up very rapidly.

The second instance is a case in which the contrary was true: the establishment of the conditioned reflex in the sick man was

almost immediately. The stimulus was the flashing of a red light. It turned out that the patient had been a chauffeur before getting sick.

From this we can draw the conclusion that in observations of higher nerve activity in man we must take into consideration the ecological (for animals) and the social (for humans) correspondence of the conditioned stimuli and the conditioned reactions. In this sense, a word, which can be used as a conditioned stimulus or a conditioned reflex, acquires altogether special meaning for a person.

Thus, the ecological line of study in physiology, stemming from the core of the teachings of I. P. Pavlov, will be of great importance for practical medicine, too.

Tue 6/p 30

NEWS OF SCIENCE AND TECHNOLOGY

NEW MEDICINALS

M. A. Zhukovsky

Until recently, plants furnished the principal source of medicinal substances. Now, because of the development of science generally and especially of chemistry, the medical profession has a new source of drugs; these drugs do not differ at all from the vegetable ones, and some are even better. These drugs are prepared synthetically.

During the period of existence of the Soviet chemical and pharmaceutical industry, hundreds of new medicinal substances have been synthesized. Even the drugs that were once extracted from plants indigenous only to hot regions, such as tropical areas, have been synthesized by our chemists. For instance, quinine, an expensive preparation extracted from cinchona bark and imported from abroad, has now been replaced by acridine, a new chemical product which possesses excellent medical properties, is less toxic, and is cheaper. In the same way, hundreds of various medicinal substances that were once imported from abroad have now been synthesized. Especially great success has recently been achieved by our scientists in this respect.

SHOSTAKOVSKY'S BALSAM

The so-called Peruvian balsam extracted from the bark of trees growing in the mountains of Central and South America is one of the most widely used balsams in modern medical practice. The Peruvian balsam is well known as an excellent remedy successfully used in surgery, dermatology, and therapeutics. It is also used in the manufacture of cosmetics and in some industrial products.

During the Great Fatherland War, when the demand for Peruvian Balsam was considerably increased, our chemists were confronted with the problem of finding a full-value substitute for that medicinal substance. The task was successfully performed by the laboratory of the Institute of Organic Chemistry of the USSR Academy of Sciences under the leadership of Stalin prize-winner Professor M. F. Shostakovsky.

In the course of his research work involving vinyl ethers, M. F. Shostakovsky synthesized a new chemical compound. A detailed analysis of the properties of this preparation confirmed its high degree of resemblance to the Peruvian balsam.

A long series of tests carried out in clinics proved that the balsam synthesized by Professor Shostakovsky did not differ, so far as its medicinal properties were concerned, from the natural Peruvian balsam, and it even had several advantages over the latter. For example, it does not produce any secondary ef-

fects, it does not dry upon exposure to the air, and it possesses better bactericidal properties than the Peruvian balsam.

Shostakovsky's balsam has been widely used in medical practice.

ALBOMICINE

An original antibiotic, "albomicine," has been recently discovered and thoroughly studied by Professor G. F. Gauze, Stalin prize winner, together with his senior scientific collaborators, M. G. Brazhninkova, V. A. Shorine, and S. D. Yudintseff, in the antibiotics laboratory of the USSR Medical Academy.

Despite the fact that the effective treatment of pneumonia and dysentery of young children has been sharply improved by the introduction into medical practice of sulfa preparations (sulfadiazene, sulfanilimide, sulfathiazole, etc), as well as of penicillin, these drugs still do not always produce the desired results. It is also known that several cases of the so-called "sulfa-resistant" forms of dysentery and pneumonia have recently been observed. All this required a persistent search for still more effective medicinal preparations. Albomicine proved to be one such preparation.

The new Soviet antibiotic is a powder of whitish color. It dissolves perfectly in water and does not produce any toxic effects when introduced in great quantities into the organism. An important feature of Albomicine which makes it superior to

other antibiotics is its tendency to remain within the organism longer, for instance, than penicillin. A study of its concentration in the blood after a single administration proved that Albomicine is retained in the body up to 2 or 3 days. The tests on animals demonstrated the complete harmlessness and the remarkable curative properties of this antibiotic, especially in cases of illness provoked by penicillin-resistant types of infection. In addition to this, Albomicine increases the protective properties of the organism.

This new preparation has been tested in the Pediatric Institute of the USSR Medical Academy, awarded the Order of the Red Banner of Labor, and has received high praise from the clinics that are headed by Professor G. N. Speransky, Active Member of the USSR Medical Academy, and Professor A. I. Dobrokhotova, Honored Scientist.

Albomicine is particularly effective for treating pneumonia in children during the first year of their lives, and for various complications of dysentery. The Pharmocological Committee of the Scientific Council of the Ministry of Public Health has recently approved the widespread use of Albomicine.

THE BLOOD SUBSTITUTE

M. Popovsky

The effective therapeutic method of blood transfusion has

been widely applied in Soviet medical practice. Several institutes, hundreds of health stations, thousands of consulting rooms throughout the whole country are preparing and conserving blood for the purpose of transfusing it into wounded and sick men. In the public health system of our country there is a special "blood service" with many thousands of doctors serving it, as well as an army of donors who give their blood for this purpose. More than 250,000 transfusions are being administered in the Soviet Union, which is many times more than in any other country in the world.

However, the use of donors' blood presents a series of substantial drawbacks. The donors' blood is expensive and comparatively unstable, and its transportation to distant places involves considerable difficulty. But the most important difficulty consists in the existence of four different groupings of human blood. Transfusion to a patient of blood of a different type may cause complications. Besides, it is very difficult and sometimes even impossible, to determine a wounded man's blood gouping under battle conditions. Therefore, the idea of devising a substitute for human blood arose long ago. For many years, however, all attempts of that sort proved to be unsuccessful. Various saline solutions, devised by the scientists, could not be substituted for blood. We know that blood is more than a liquid containing a certain quantity of salts. It feeds the tissues of the body and must, therefore, contain such nutritious substances as sugar and albumin. But the principal defect of all projected substitutes in Europe and America consisted in the fact that they

did not stimulate the formation of the patient's own blood, whereas in many cases the possibility of forcing the sick organism to generate blood corpuscles would have ensured his recovery.

Then, in 1942, N. G. Belenky, Doctor of Biology and Professor of the D. I. Mendeleyeff Institute of Chemistry and Technology of Moscow, began his research for the purpose of developing a blood substitute. Shortly before that time the scientist and his colleagues had been engaged in the pursuit of a purely practical problem: they had been seeking a means of increasing the quantity of blood obtained during the slaughter of cattle. Once, 24 hours before the slaughter, they pumped out about half of the whole blood from a cow. Upon slaughtering the cow, they found that the quantity of this cow's blood had been entirely replenished. N. G. Belenky was deeply interested in the process of rapid restoration of such large quantities of blood by animals. Evidently, he assumed, there occur in the bodies of tested animals which had lost much blood, some substances which stimulate the functions of blood-forming organs. These substances, the scientist named them "hemoactines," i.e., activators (intensifiers) of blood formation, -- must be secreted by organs of animals that have been partially deprived of their blood. Would the hemoactines taken from one organism increase the activity of blood-forming organs in another? The answer could be found only by test.

A servant brought some rabbits into the laboratory; from

these, part of the blood had been previously removed. Some of the rabbits were injected with a small quantity of "hemoactivated" cow's blood, or, more precisely, they received its liquid portion -- blood serum. Other animals received no injections. Results confirmed the scientist's assumption. The animals that had been given the serum restored their original quantity of blood twice as quickly as those that had not been submitted to that procedure. Every time these tests have been repeated, they have invariably given the same results: the serum increased the activity of blood-forming organs and considerably improved the state of animal's health.

Professor Belenky perfected his discovery during the third year of the Great Fatherland War. Thousands of wounded soldiers needed blood tranfusions. The blood was conveyed to the fighting front from the distant rear, transported by special cars and airplanes. But the donors' blood merely replaced the blood lost by the sick and wounded men without stimulating the blood-generating processes within their bodies. Meanwhile, many of these men were suffering from the sluggish activity of their blood-forming organs.

N. G. Belenky had a miraculous remedy in his hands. Some grams of his serum increased the blood-forming activity of rabbits and dogs. How good it would be to utilize this remedy for the help of men! However, animal blood cannot be transfused into man; as a rule it produces a devastating action in his organism. Why is human blood incompatible with animal blood?

It had already been established long ago that the plasma, composing the principal mass of blood, was different for each kind of animal. These differences are even observed among representatives of the same species. The plasma of one animal becomes poisonous when injected in a given quantity into another animal. But this is only one reason against the use of animal blood for transfusions. The other reason consists of the fact that while mixing different groups of blood, the blood corpuscles agglutinate, sink, and being no more able to serve the organism, prevent the tissues from receiving oxygen. How could we eliminate the results of plasma heterogeneity when injecting animal blood into man? The scientist was deeply concerned with this question. He was firmly convinced of the possibility of discovering a miraculous substance that would substitute for human blood and at the same time would serve as an intensifier of the blood-forming process.

The Soviet scientists faced an extremely difficult problem: it was necessary to develop the serum in such a way that, while being removed of all properties dangerous to man, it should not at the same time be deprived of its capacity of increasing blood-forming activity in a sick man's body. All this demanded a great deal of effort, energy, and devotion. Only after innumerable tests did the indefatigable researcher and his assistants finally achieve the desired result.

The day came when a routine control test with dogs showed

that no harmful consequences were observed on the animals during the injection of especially prepared cow's serum. Further numerous control tests confirmed the fact that the obtained serum was harmless to any kind of animal. Now it was necessary to test its action on man. N. G. Belenky decided to conduct this test on himself. In the presence of his colleagues he injected venously 400 cubic centimeters of the prepared serum into himself. The same quantity of raw cow's blood injected into a man would have inevitably killed him. The new preparation produced no harmful effect upon the scientist.

In order to put this discovery fully into the hands of Soviet doctors, it was necessary first to determine the curative properties it would demonstrate when administered to a patient. Professor D. A. Arapoff, Chief of the Surgical Clinic of Sklifosovsky's Institute took upon himself the task of carrying out this serious test. His tests were no less daring than those conducted by the discoverer himself. D. A. Arapoff gained full confidence in this preparation and transfused it to men of widely-varying blood groupings. In cases of necessity the serum was transfused in huge quantities -- up to 3 or even 4 liters at once.

The most beneficial action of the serum was demonstrated with burn cases. Once an electrician was brought to the clinic; almost half his skin surface had been burned. Doctors were seriously concerned about this patient's life. First of all it was

necessary to prevent trauma, as well as the coagulation of blood which always takes place after a burn. Formerly, a saline solution, or the so-called physiological solution, was usually applied in such cases. But this solution does not contain any albumin, which is so necessary for an organism struggling for his life. Belenky's serum contains it however, and Professor Arapof, therefore, courageously applied it. The patient received 4 liters of the new preparation. The state of shock ended, the blood received it normal thickness. It was then possible to begin treatment. After the first strips of skin had been transplanted to the burnt surface, the patient received another injection of Belenky's preparation. The strips began quickly to heal and to assimilate. In 3 months the patient left the clinic an absolutely healthy man. A great deal of such masterly and daring tests with the serum have been conducted by Professor Arapoff and his colleagues. Besides Sklifosovky's Institute, this serum of non-specific grouping has been tested in the Central Traumatological and Orthopedic Institute, in the C. P. Botkine Hospital, and in many other medical institutions of Leningrad, Briansk, and Minsk. More than 10,000 transfusions of the animal serum have been administered by doctors to patients suffering from various disturbances. The ability of the serum to raise blood pressure in the vessels and to increase the activity of blood-forming organs made it an indispensable medication at the bedside of every wounded man in need of blood. Belenky's preparation quickly healed such serious illnesses as dyspepsia. Also, to the men who could not take any

food because of esophagus affection, it completely replaced an albumin diet during a few weeks. In short, the serum of non-specific grouping discovered by Professor N. G. Belenky proved to be a perfect substitute for the liquid part of the blood, a medical preparation to which the surgery of all countries in the world have been looking forward. Cheap, and at the same time possessing extremely valuable qualities, this preparation is now receiving an ever-growing application in the therapeutic practice of our medical institutions. It is going to be a mass medicinal remedy.

The discovery of non-specific serum is a remarkable victory of the Soviet biology which follws the way carved by I. V. Mitchurin and I. P. Pavlov. For the discovery and clinical tests of this serum, the scientis-innovators have been honored with the Stalin prize.

END

A SUBSTITUTE FOR BLOOD

M. Popovskiy

The transfusion of blood -- this an effective healing method widely used by Soviet medicine, several institutes, hundreds of stations, thousands of special offices throughout the country prepare, preserve, and give transfusions of blood to the wounded and sick. There is a special "blood corps" in the public health system of the country with tens of thousands of doctors and an army of volunteers who are giving their blood for transfusions. More than 250,000 blood transfusions are performed each year in the Soviet Union, many times more than in any other country in the world.

However, the use of blood from donors has many basic shortcomings. Blood from donors is expensive, it spoils comparatively quickly, there are considerable difficulties involved in sending it long distances. The main difficulty lies in the fact there are four different human blood groups. Transfusion of blood to a sick person from a group unlike his can lead to complications. In addition, it is very hard and sometimes impossible under conditions in the field, to determine the blood group of a wounded person.

Therefore, long ago the idea of creating a substitute for human blood arose. For many years all such attemps ended in failure. The various salt solutions developed by the scientists could not replace blood. But then blood is not simply a liquid with a certain amount of salts in it. It feeds the tissues of the body and should, therefore, contain nutritive substance: sugar and proteins. But the chief shortcoming of all substitutes proposed in Europe and

and America was the fact that they did not cause the building of the sick person's own blood. In many cases the change of making the sick body build blood cells would have guaranteed its recovery.

In 1942 N. G. Belen'kiy, doctor of biological sciences and professor at the Moscow Chemical-Technological Institute imeni D. I. Mendeleyev, joined the search for a substitute for blood. Not long before this the scientist and his associates had been busy with a purely practical problem: they were looking for the possibility of increasing the amount of blood obtained during the slaughter of big horn cattle. Once, twenty-four hours before the slaughter of a cow, they pumped about half of all her blood out. In twenty-four hours the amount of blood in the body had been completely replaced.

The rapidity with which animals replace such large quantities of blood deeply interested N. G. Belen'kiy. Evidently, he proposed, in the body of animals which are being experimented upon and have lost a great deal of blood, some kind of agents which increase the activity of the blood-making organs appear. These agents -- the scientist called them "hemoactins", which means activators (intensifiers) of blood-making -- should be secreted by the organisms of animals which have had part of their blood removed. Will hemoactins taken from one organism increase the blood-making activity in the organs of another? Only experimentation could tell.

The assistant brought to the laboratory several rabbits from whom a portion of the blood had been removed. Some of them were injected with a few "hemoactine" from the blood of cows, or, to be more exact, the liquid part of the blood -- the serum. Others were not injected. The results confirmed the scientist's hypothesis. In

animals which had been injected with the serum the former amount of blood was replaced twice as fast as it was in those which had not been injected. No matter how many times the experiment was repeated, the results were invariably the same: the serum speeded up the activity of the blood-producing organs and considerably improved the state of health of the animals.

The Great Fatherland War was in its third year when Professor Belen'kiy made his discovery. Thousands of wounded soldiers needed blood transfusions. Blood was brought from the rear, special railroad cars and airplanes were making the deliveries. But the donors' blood, transfused into the blood vessels of the sick and wounded who had lost blood, did not cause their blood to be re-made. In addition, many people were suffering from insufficient activity on the part of the blood-making organs.

N. G. Belen'kiy had a wonder-working agent in his hands. Several grams of his serum increased blood-making activity in rabbits and dogs. How wonderful it would be to use this agent to help people! However, the blood of an animal cannot be transfused to a human being: as a rule, it produces a destructive reaction in his body.

Why can't the blood of animal and a person mix?

It had long ago been established that protein, which comprises the basic mass of the blood, is different for each species of animal. This difference is observed even within the same species. The protein of some animals, injected in a known quantity into the organism of others, proves toxic. But this is only one reason hindering the use of animal blood in transfusion. Another cause is the

fact that when different blood groups are mixed the blood corpuscles agglutinate, precipitate, and, incapable of serving the organism any longer, leave the tissues without oxygen.

How could the consequences of the differences in the type of the albumen be eliminated in transfusing the blood of animals to human beings? This idea agitated the scientist deeply. He firmly believed in the possibility of creating a wonderful agent which would at the same time substitute for human blood and serve to speed up blood-making.

The Soviet scientist was faced with a complicated problem. It was necessary to develop a serum which would lose all the properties harmful to human beings but at the same retain the ability of raising the blood-making activity of the sick organism. Much labor, energy, and strength was needed for this. Only after many experiments did the tireless scientist and his assistants achieve the desired result.

There came a day when the customary check on dogs showed that when a specially developed blood serum was injected no harmful results were observed. Numerous checks confirmed the fact that the serum obtained was innocuous for any animal.

The next thing to do was to check its action on a human being. N. G. Belen'kiy decided to do this dangerous experiment on himself. In the presence of his associates he injected himself with 400 cubic centimeters of the serum which he had developed. The same amount of non-processed blood injected into a human being invariably led to his death. The new preparation had no harmful effect on the organism of the scientist.

In order to hand his discovery over to Soviet doctors completely, he had to explain its salutary properties in the fight for the life of a sick person. The director of the surgical clinic at the Institute imeni Sklifosovskiy, Professor D. A. Arapov, undertook the task of conducting this serious experiment. His experiments were no less daring than those performed by the discoverer of the serum. D. A. Arapov believed in the preparation and gave transfusions of it to people with different blood groups. When necessary the serum was given to patients in very large doses -- up to three-fifths of a liter at one transfusion.

The serum had its most beneficial effect in cases of burns. Once, an electrician with burns covering almost half of his skin was brought to the clinic. The doctors feared greatly for his life. Above all, they had to combat shock and coagulation of blood, which always occurs after burns. Previously a salt or so-called physiological solution had been used for this. But such a solution did not contain protein, which is so necessary to the organism fighting for its life. Belen'kiy's serum contains protein and Professor Arapov used it unstintingly. The patient was given four liters of the new preparation. The condition of shock changed. The blood took on its normal thickness. They could now get on with the healing. When the first skin grafts were made onto the burned area the patient was again given Belen'kiy's preparation. The grafts soon began to grow. In three months the patient left the clinic completely recovered. No small number of these daring and expert experiments in the use of the serum were made by Professor Arapov and his associates.

In addition to the Institute imeni Sklifosovskiy, the Central Institute of Traumatology and Orthopedics, the hospital imeni

S. P. Botkin, many hospitals in Leningrad, Bryansk, and Minsk tested this serum which is not limited in its use to a single species. Doctors gave more than 10,000 transufsions of animal serum to patients suffering from various disorders. The ability of the transfused serum to raise the blood pressure and to increase the activity of the blood-making organs made it an indispensable agent at the bedside of the patient who had lost blood. Belen'kiy's preparation rapidly cured such serious children's diseases as dyspepsia. In people who could not take nourishment because of some injury to the esophagus it completely replaced protein feeding in the course of a few weeks. In brief, Professor N. G. Belenkiy's serum, non-specific to species, turned out to be a full value substitute for the liquid part of the blood, a preparation which surgeons all over the world had dreamed of.

Inexpensive and at the same time extremely valuable for its properties, the preparation is now being introduced more and more widely in practice by medical institutions. It has to become a mass-scale medical preparation.

The discovery of a serum which is non-specific as to species is a wonderful victory on the part of Soviet biological science, following the trail blazed by I. V. Michurin and I. P. Pavlov.

For the discovery and clinical testing of the non-specific-to-species serum, scientist-innovators N. G. Belen'kiy and D. A. Arapov were awarded the Stalin Prize.

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NEW VITAMINS FROM PLANTS

The wild forest shrub, the oblepikha [creeper], has been studied at the All-Union Scientific Research Institute for Vitamins. Researchers show that its fruit is very rich in vitamins. One hundred grams of the raw mass of berries contains up to 180 milligrams of Vitamin C and 10 milligrams of ~~Vitamin~~ Provitamin A (carotene).

The oblepikha is widespread in Siberia and the Altay. At present it has been acclimatized in the central zone of the Soviet Union. The berries of the oblepikha, left on the shrub till the first autumn frosts, acquire a pleasant flavor with a faint odor of pineapple. The valuable new vitamin plant is being grown on a large scale in Moscow and Lenin oblasts.

In addition to the oblepikha, the institute has done research on the vitamin content of varieties of a pumpkin produced in Rostov Oblast at the Biryuchikutsk Experimental Station. One hundred grams of the raw mass of this pumpkin contains up to 20 milligrams of carotene. The Krasnodar Vitamin Combine has mastered the preparation of carotene from the pumpkin.

~~IN~~ THE WAYS OF MICHURIN

P. A. Yesaulov, Candidate
In Agricultural Sciences

Drawings by V. Poznanskiy

Productive stock-raising is one of the basic branches of ~~agri-~~ farming
~~culture~~, satisfying the needs of the people for important food products and supplying the enterprises of food and light industry with raw material.

The prewar level of head of productive public stock was achieved in our country in the first years of the postwar Stalin Five-Year Plan. For 1948 alone the head of big horn cattle in the kolkhozes increased 23 percent, the head of swine 75 percent, sheep and goats 16 percent. In April 1949 the Council of Ministers USSR, and the TsK VKP (b) adopted the Three-Year Plan for the development of public kolkhoz and sovkhoz productive stock-raising for 1949-1951. In this plan the objective of all kinds of development of social stock-raising was established as the central objective of the Party and State in the development of agriculture.

The achievements in the fulfillment of the first postwar Five-Year Plan in the field of stock-raising will ~~join~~ enter into the history of socialist agriculture as an important victory of the Soviet people. In 1949 and 1950 the head of social stock in the kolkhozes increased at rates which had hitherto been unknown even in our country. The prewar level of ~~big horn~~ cattle was exceeded by 40 percent, of sheep and goats 63 percent, of swine 49 percent.

Especially great successes in the improvement of stock-raising were made by the kolkhoz peasants of the Ukrainian and Belorussian

SSR's, and Kursk, Moscow and Orlov oblasts. The kolkhozes of Omsk and Kemerov oblasts in Siberia, Penzen and Tambov oblasts, and the Transcaucasian and Middle Asian republics markedly increased the prewar level of the heads of all kinds of stock.

One of the most important achievements in the development of social productive stock-raising in the kolkhozes and sovkhozes is the improvement of pedigree. In the postwar year much work has been done in improving the quality of the herd. For 1949-1950 alone the kolkhozes have been sold over half a million high-quality, pedigreed stud animals -- bulls, rams, hogs, the most widespread highly productive breeds in the USSR.

Progressive Michurinist biological science has played an enormous role in the transformation of our stock-raising. As is known, Darwin's teachings on the evolution of organic forms in nature do not indicate the methods in the change of animal and plant organisms along a line necessary to man. Adding to and lifting Darwinism to a qualitatively new and higher plane, Michurinist science is revealing the cause for the changes in heredity, is equipping the workers in stock-raising with methods for improving and creating new, highly productive breeds of agricultural animals.

[Picture on page 8 of text:]

Kazakh whitehead

[Pictures on page 9 of text:]

Lebedin cow [Second column, top]

Syche bull [Second column, center]

Liven swine [Second column, bottom]

Breytov swine [Third column, top]

Sal'sk fine-fleeced sheep[Third column, bottom]

[Pictures on page 10 of text:]

Askaniysk merino sheep [First column]

Kazakh fine-fleece sheep [Third column]

Through the efforts of scientists and agricultural workers over 30 new highly productive breeds of big horn cattle, sheep, swine, and horses have been developed in our country during the years of the Soviet power. Especially great successes have been made by stock-raisers in recent years with the completion of the work of developing the Sychev, Lebedin, Kazakh whitehead and other breeds of big horn cattle, the Breytov and Liven breeds of swine, the Stavropol', Sal'sk, Dagestan Mountain and other fine-fleece and semi-fine-fleece breeds of sheep.

The improvement of feeding, maintenance, and care of the cattle, the enlarging of stock-raising farms led, in many kolkhozes, to an enormous increase in the productivity of social stock-raising. From year to year there is an increase in the group of outstanding experts in social stock-raising, who obtain more than 6,000 kilograms of milk from the cattle in their charge. The names of their Heroes of Socialist Labor are widely known among us: Ye. V. Fomnaya from Karavayevo Sovkhoz, who obtained 7,385 kilograms of milk from each of 8 cows, M. Kh. Savchenko, Ye. D. Nartova, and many others who obtained more than 6,000 kilograms from one cow.

The basis of these successes is the theory and practice of milking cows worked out in the USSR on the basis of Michurinist science.

Experience confirmed the fact that the principal factor in obtaining high productivity is abundant and full value feeding of the cattle in winter and summer and high skill in milking.

The Karavayevo Pedigree Sovkhoz has been engaged in milking cows for over twenty years. On the average 6,000-6,200 kilograms per cow are obtained here annually. Every new generation of animals produced in this sovhoz is distinguished by a still higher milk productivity. Many new calves give up to 30 kilograms of milk per day and after their first lactation 6,000-9,000 kilograms. The sovkhoz has 30 cows from which 75 to 100 and more than 1,000 kilograms of milk have been obtained.

In order to give 40-50 kilograms of milk per day, a cow must eat more than 100 kilograms of various feeds. Only strong, healthy cows can eat such an amount of feed. The whole system of care and feeding of animals at Karavayevo is aimed at raising such animals. (For details see No 2 of Nauka i zhizn' 1951, Editor).

The change in the nature of the organism by means of abundant feeding and good care makes for unusual successes in increasing the productivity of stock-raising. However, this process requires considerable time. The crossing of animals of different breeds is, as Academician T. D. Lysenko points out, a more "radical and faster method of changing the breed -- the offspring of the given animals". Hybrids have an unstable heredity and yield more to the effect of new conditions of life, of environment.

In the central oblasts of Kazakhstan, which have boundless desert and semi-desert pasture lands, a kind of cattle adapted to the harsh local conditions has been propagated. When the meat was of fine grade, the live weight of these cows did not exceed 300-350 kilograms, while the average milking of selected herds did not exceed 1,000 kilograms per year per cow. Highly productive cows brought from other places acclimatized themselves poorly under the harsh conditions of Central Kazakhstan. Their productivity fell. To improve the breed of Kazakh cattle Soviet scientists adopted the method of crossing them with studs of the Hereford breed.

The work of many years in proper selection and breeding of the hybrids obtained and in improved care, maintenance and feeding of the cattle was crowned with success. A new breed of cattle was developed in Kazakhstan -- Kazakh whitehead. Cows of this breed attain a weight of 500-600 and sometimes even 800 kilograms. On the average they give more than 2,000 kilograms of milk. There are already hundreds of thousands of Kazakh whitehead cattle in kazakhstan, Chkalov, and Stalingrad oblasts. The productions of a new breed led to a solution of the problem of qualitative improvement of stock-raising in the arid steppes of the Transvolga and the central regions of Kazakhstan which have tens of millions of hectares of pasture-lands.

The work in the kolkhozes of Smolensk Oblast in developing the Sychev breed of big horn milk-meat cattle went on for more than 25 years. During this time the kolkhozes of the country received more than 100,000 pedigreed bulls from Smolensk Oblast.

Following Michurin's teachings, Soviet stock-raisers achieved

unusual successes not only in the field of milk and meat stock-raising. Scientific workers, in close collaboration with progressivist-innovators of socialist sheep-raising, produced 12 new fine-fleece and semi-fine-fleece breeds of sheep. Among them, outstanding for the quality of their wool, are the Askaniysk, Kavkaz and Altay breeds. The Krasavchik ram, of Askaniysk breed, has a live weight of 174.5 kilograms and the record shearing for this breed is 22.3 kilograms. Altay sheep, which are also distinguished by large shearings and live weight, are well adapted to prolonged winter subsistence under the conditions of the harsh Siberian climate.

A new, excellent breed of Sal'sk fine-fleece sheep has been bred by the scientists and experts in stock-raising at the Horse Farm imeni S. M. Budennyy, Rostov Oblast. The average shearing of fine-fleece sheep of the new breed amounted in 1946 to 5.9 kilograms and in 1950 to 7.1. The Sal'sk, and also the Stavropol' breeds of sheep, whose breeding was completed in recent years, are a highly productive breed of wool sheep. Ram No 411 of Stavropol' breed has a live weight of 125 kilograms and gives a shearing of fine-fleece amounting to 25.3 kilograms per year. This is a world record.

The development of new breeds of sheep on the basis of Michurinist science has permitted regions with harsh or specific conditions, where sheep with fine or semi-fine fleece could not be bred, to become sheep-raising regions. In southeast Kazakhstan such breeds are the Kazakh fine-fleece breed, which is excellently adapted to the steppe and semi-steppe pasture lands of this region, and in the mountain regions such breeds are Kazakh arkhromerino.

The development of new breeds of farm animals, the increase

in the productivity of big horn cattle, sheep and swine point to the inexhaustible possibilities of our Fatherland stock-raising. In the decree by the Party and the Government on the Three-Year Plan for the development of stock-breeding in 1949-1951, Soviet scientists and workers in agriculture are presented with responsible tasks. These tasks have this objective: using all the means of modern zoo-technical science, based on the achievements of Michurinist biology, to produce an abundance of products of stock-raising in our country. The wide use of Michurinist methods in practice will allow us to successfully fulfill the plan qualitative transformation and improvement of productive stock-raising, to attain new successes and achievements in this work.

No 10, 1948

FROM THE HISTORY OF CHINESE MEDICINE

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Honored Scientist

The great Chinese people have enriched world culture with many important discoveries and remarkable achievements in the fields of literature, art, and science.

Great importance can be attached to the works of Chinese scientists in the sphere of medicine, which had its inception in China several thousand years before Christ and is one of the oldest medical sciences in the world. The discovery of blood circulation, of the constant relationship between the human organism and its environment, the use of narcotics during surgical operations, the introduction into medical practice of the principles of preventive treatment, origination of many methods of medical treatment, discovery of many valuable pharmacological and therapeutic medicinals, and a series of other achievements of Chinese medicine represent not only a vast historical interest, but also vital discoveries of importance to contemporary science.

The beginning of Chinese medicine is lost in the immemorial times of antiquity. A Chinese herbal "Shen-nun-ben-tsao", dating from the twentieth century BC, contained detailed descriptions of many medicinal plants. The most ancient Chinese book, in which the medical knowledge of the Chinese people was collected and systemized, is "Neydzin" (Book on Internal Things),

written between the eighth and seventh centuries, BC; it has served as a handbook for many generations of Chinese physicians.

The ancient Chinese medicine reckoned about 500 different human diseases. They were subdivided into infections of the large and small organs, into catarrhal, feverish, cutaneous, and ocular diseases, and into infections of the oral cavity, teeth, neck, bones, and others.

Chinese physicians correctly believed that it was easier to prevent an illness than to treat it, and that it was also easier to preserve the health than to restore it when it was disturbed. In treating a patient, the principal attention was concentrated upon the causes of the illness. Chinese medicine had always attached the greatest importance to prophylactic methods of treatment. Chinese doctors, long before Europeans, had discovered and put into practice the method of preventive treatment of smallpox by means of prophylactic inoculation.

The doctors of Ancient China considered as an outstanding method for diagnosis the examination of the patient, his auscultation, questioning, and examination of his pulse and urine, to the modifications of which they attached gread diagnostic importance. Owing to their superficial knowledge of human anatomy, the doctors seldom used the surgical methods of treatment. This poor knowledge of anatomy was due to the religious prohibition against performance of autopsies.

In the ancient Chinese book "Neydzin" we find hygienic

advice, some anatomical and physiological information, descriptions of symptoms of diseases and methods of treatment. We find there also descriptions of massages, of acupuncture (needle pricking), and mox (cauterization), therapeutic methods that were very much used in China for treatment of various diseases.

The ancient doctrine of acupuncture is based upon the theory of Chinese physicians that each internal human organ has two corresponding passeges symmetrically arranged and shaped in the form of tubes. Blood and pneuma flow through these tubes, and their passage are located the so-called "vital points." By inserting needles into these "vital points," the Chinese physicians tried to influence the course of disease of the affected internal organs, giving the disease the availability of an outlet. Chinese medicine reckons more than 380 "points" of application for needles, and these "points" are sometimes located rather far from the affected organ. According to Chinese physicians' observations, the curative effect produced by introducing the needles depends upon the duration and the depth of the prick. Needles for acupuncture are made from gold, silver, or steel. There are usually about 40 types of such needles in a set; their sizes vary from 1 to 28 centimeters. In some "vital points" the needles are inserted perpendicularly to the muscles (for example, the calf of the leg, the shoulder, etc); in other locations, where the muscles are smaller (hands, forearms), shorter needles are used and are inserted parallel to the muscles. Chinese literature describes many cases of successful use of needle insertion

during various diseases, especially diseases of functional character. The therapeutic effect obtained by this method of treatment is explained by the action of these needles upon the nervous system, which has an outstanding influence on all processes of the body's activity.

The treatment by means of "mox" (cauterization) of "vital points" is also very much used in Chinese medical practice. This method of treatment can be considered as a particular method of protein therapy and as an application of biogen stimulators, which are developed in the tissues after cauterization, and which stimulate the physiological and regenerative activity of the organism.

As an external treatment, Chinese medicine has used massage since most remote times. Massage is administered either manually or with the aid of special apparatus. The manual method consists of rubbing, kneading, and slapping with the hands, palms, or fists, and even of pinching. The massage instruments consist of small wooden hammers of various sizes, with which the therapist strikes the muscles of the affected parts of the body. For the massage of chest, back, and limbs a kind of spade-shaped apparatus -- usually made of guaiacum or logwood -- is used. The skin of the body is rubbed vigorously with the wider end of the spade which has been soaked in a mixture of water, oil, and salt. This is continued until the skin becomes completely red. Abdominal massage is performed by means of a device composed of two rolls rotating on one axis. In order to obtain elasticity of the hands,

smooth stone balls or small rolls are used.

Chinese medical science has always paid special attention to the use of medicinal plants. Chinese physicians averred that "there was no plant that could not be employed as a medicinal substance." They also proved that different parts of the same plant -- buds, leaves, bloom, and roots -- possess different medicinal properties, and that for medical purposes they must be gathered in specific seasons of the year.

Numerous Chinese herbals and pharmacopeias that were compiled long ago contain detailed descriptions of medicinal plants. As early as the year 2037 BC, a special herbal, apparently the oldest one in the world, was compiled in China; it contained approximately 100 descriptions of plants possessing medicinal properties. The great majority of almost two thousand medicinal remedies mentioned in "Ben-tsao-gan-mu" -- a 52 volume Chinese pharmacopeia of the sixteenth century -- belong to the vegetable world.

The following medicinal plants are used in Chinese medical practice: aloe, aconite, belladonna, hawthorn, valerian, pomegranate, camphor, Indian hemp, lemon, poppy, almond, myrrh, nutmeg, juniper, mint, fern, pepper, wormwood, rhubarb, camomile, fennel, garlic, saffron and many others. Drugs prepared from ginseng and Chinese lemon tree were widely used.

Ginseng ("man root") has been known in China as a medicinal remedy for approximately three thousand years. Chinese medical science calls ginseng "man root" and "world's miracle" be-

cause it makes the old young again and restores debilitated men to good health. The root of ginseng is especially valued. Tests of ginseng preparations carried out by Soviet scientists proved their indisputable effectiveness in a series of diseases, including diabetes.

In the famous pharmacopeia "Ben-tsao-gan-mu" the Chinese lemon tree is put in the first category of drugs which are recommended to be administered for restoring energy in cases of overfatigue, for regulating respiration, for improving spirits and sexual functions. The Chinese call it "oo-way-tsi" which means "fruit with five testae." Immediately after taking one dose of this drug, according to this pharmacopeia, " a man's vitality increases."

In accordance with the task assigned by the Biological Department of the USSR Academy of Science, the Special All-Union Committee for Vegetable Resources has conducted numerous experimental and clinical tests of the Chinese lemon-tree preparations and stated that this drug increased intellectual and physical efficiency and considerably improved the keenness of vision. The Chinese lemon tree preparation is a valuable stimulant in the case of long absence of rest and sleep.

We have also carried out various tests of a series of other medicinal plants used in Chinese medical practice. Among others, we tested the preparations of hawthorn, which are now successfully administered in the cases of heart disease, prepara-

tions of magnolia that produce a clearly-pronounced therapeutic effect in cases of hypertonic disease, as well as other remedies prepared from medicinal plants.

Chinese pharmaceutical therapy also uses preparations from tissues and organs of animals. Young, not yet ossified, horns of Siberian speckled deer have been used by the Chinese people since long ago. Actually the "pantocrine" prepared from these hart-shorns is very well known as an excellent remedial tonic.

Among medicinal remedies of mineral origin, preparations from gold, silver, copper, mercury, arsenic, sulfur, and lime have been utilized in China since very remote times.

In the first half of the medieval period, Chinese medical science was under the influence of various religious and mystical doctrines and therefore experienced a period of stagnation and decline. Only in the second half of the Middle Ages did it gradually liberate itself from religious and mystical ideas and begin its progressive development. At the beginning of the 19th century, Chinese medicine was put on a scientific basis and began to develop more rapidly. But only after the victory of the Great People's Revolution, and after the formation in 1949 of the Chinese People's Republic, has the course of medical science attained the highest level of its development. In that same year the Ministry of Public Health was established in China. The Chief Anti-Epidemic Administration, with branches in every region of the country, was organized in the People's Republic; the State Sanitary

Administration was created, and sanitary epidemiological and new bacteriological institutions, hospitals, and polyclinics were opened. Widespread work has developed in the field of communal hygiene. In 1950, for the first time in the history of China, the law establishing compulsory, free anti-smallpox vaccination was enacted. This year, an all-Chinese Conference debated the problems of organization of prophylactic and anti-epidemic measures. Concerning this Conference, Mr. Li-De-Chan, the Minister of Public Health of the Chinese People's Republic, gave a report on the results of the anti-epidemic work accomplished in 1950 and on the tasks anticipated for the future.

The Communist Party, the Government of the Chinese People's Republic, the local authorities, and the trade unions are exerting their utmost in the administration and development of the public health program. Medical science is successfully progressing in the country, and the research work in the area of prophylaxis and treatment of diseases is developing rapidly.

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