KIM BONG HAN, D. Sc. (BIOLOGY)

ON THE KYUNGRAK SYSTEM

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Publisher's Note

In modern biology the problem of the unity of the organism and the environment, problem of the regulating mechanism which ensures a complete co-ordination of the function and activity of each component of the organism, and problem of the biochemical basis of the activity of living substance, constitute the most fundamental problems.

Biologists and medical scientists of the world have set up a number of well-substantiated theories and attained valuable achievements in the course of their research into these problems.

But the modern biology and medical science still have many problems to solve — the functions and role of nucleic acids in metabolism, the essence of hereditary phenomena, the growth and development of such diseases as tumor and their cure, etc.

This is connected with the fact that the modern biological theories still fail to give a full elucidation to the mechanism that ensures the unity of the activities of the organism.

Such limitations of the existing theories have long since placed it on the order of the day for biology and medical science to probe further into the secrets of the living substance, to find out a new course of development for themselves.

The Korean biologists and medical scientists found a clue to the solution of this problem in Kyungrak, which makes up the core of Dongeuihak, the traditional Korean medicine, one of the brilliant scientific heritages handed down by their ancestors.

Professor Kim Bong Han and his associates discovered the substance of Kyungrak, a new anatomico-histological system in the living body. It is an integrated system entirely different either from the nervous system or blood and lymphatic vessels. The results of their research were made public in August 1961, which created a sensation in the world of biology and medicine as the discovery of another secret of the living body.

Since then their research work made further progress, blazing the trail along an untrodden track to divulge the secrets of the organism.

The Kyungrak research collective clarified the histological microscopic composition of a structure (Bonghan corpuscle) found in the Kyunghyul position and a tubular structure (Bonghan duct) which connects the Bonghan corpuscles; they also disclosed their distribution and discovered new facts.

The Bonghan corpuscles, according to the results of their researches, have their own specific histological structure, and are distributed not only in the superficial layer of the skin but in the profund subcutaneous tissues, in the blood and lymphatic vessels and around the internal organs as well.

Bonghan ducts which link the Bonghan corpuscles are distributed round the artery, vein and lymphatic vessel, and even within them in an isolated manner, as well as in the superficial layer of the body.

The collective of Kyungrak researchers confirmed, through bioelectrical experiments, that the Kyungrak system has specific bioelectrical features. It was also proved that the Bonghan corpuscle is an excitable tissue which reacts differently to various external and internal stimuli and is correlated with certain internal organs.

The researchers delved into the chemical composition of the contents (Bonghan liquor) of the Bonghan duct by biochemical and histo-chemical methods, and established the fact that there was liquor circulating along a definite course in the Bonghan duct, a liquor containing nucleic acids, especially a large amount of desoxyribonucleic acid (DNA).

This has made it necessary to reconsider the accepted conception that DNA exists only in the nucleus and that ribonucleic acid only in the nucleolus and cytoplasm.

Today the substance of Kyungrak in all its aspects has been brought to light as a system covering the whole body, regulating and coordinating the biological processes that lie at the bottom of the vital activity.

This is indeed an epoch-making discovery and a big step forward in the development of biology and medical science. It is a product of bold scientific research free from existing formulas and theories, a fruit of enormous scientific stamina coupled with a high level of technique, and an embodiment of correct methods of analysis and synthesis applied from the viewpoint of unity between forms and functions.

In the long years of research work by Professor Kim Bong Han and his associates, there cropped up many difficulties and

they had to grapple with countless complex problems. But they never yielded.

Comrade Kim Il Sung and the Central Committee of the Workers' Party of Korea always showed deep concern for their research work, inspiring them with courage all the time. This enabled them boldly to explore an untrodden path of scientific investigation and bear the brilliant fruits.

With the great achievements of the research in the Kyungrak system, it has now become necessary to re-examine the prevailing theories that give one-sided explanation to the fundamental problems of the phenomena of life including the regulating mechanism of the living body, not knowing that the Kyungrak system is an objective being.

The new achievements have opened up broad prospects of solution of such fundamental problems arising in modern biology and medical science as differentiation of the cells, metabolism, heredity, the reactivity of the organism, the causes and development of diseases, etc., thus paving the way for the solution of problems of better health and longer life of man.

This great discovery by the scientists of our country signifies a revolutionary event ushering in a new stage in the development of modern biology and medical science. We are convinced that the discovery will go down in history as a monument of science.

Kim Bong Han, D. Sc. (Biology)

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INTRODUCTION

It is one of the most fundamental questions in biology to fully clarify the material basis of the unity of the organism and the environment.

Modern biology considers that the unity of the activities of the organism is regulated by the functions of the nervous system and many humoral factors including hormone.

Such theories have solved many questions in modern biology, but they have failed to encompass all the mechanism providing the unity of the activities of the organism.

Our discovery of the substance of the Kyungrak system was of great significance in overcoming such shortcomings in modern biology. In this connection we made public the result of our research in August 1961.

We have carried on our research into the Kyungrak system in two main directions.

One has been the deeper study of the anatomico-histological features and the functional features of the Kyungrak system as a specific, new connective system of the organism and the other has been the exposition of mechanism regulating the biochemical processes of the Kyungrak system.

In the course of our research we have been further convinced that a certain new system is playing a part in the mechanism regulating the material metabolism, the basis of the vital activities ensuring the unity of activities of the organism.

In our view, this new system is one specifically linking and regulating the processes occurring in all positions of the organism.

In the course of our research into the Kyungrak system we have received boundless solicitude by Comrade Kim Il Sung personally and the Central Committee of the Korean Workers' Party. We have also been given warm support and encouragement by the scientific world and the people at home and abroad.

This has been the source of immense inspiration in our research work.

Part I

MORPHOLOGICAL STUDY OF THE KYUNGRAK SYSTEM

Our discovery of the substance of Kyungrak has raised a new question of principle before modern biology.

Having discovered the Kyungrak system as a new anatomico-histological system distinct from the vascular and nervous systems, our research staff set it as the first and foremost task in its further research systematically to elucidate the general morphological features of the Kyungrak system.

We have conducted morphological study of the Kyungrak system through experiments on human bodies and animals applying various anatomico-histological research methods. As a result, we have discovered a number of new structures.

Chapter I

MORPHOLOGY OF THE BONGHAN CORPUSCLE

1. ANATOMICAL OBSERVATIONS ON THE BONGHAN CORPUSCLE

After discovering the Bonghan corpuscles (Corpusculum Bonghan, structures found in the Kyunghyul positions) distributed in the skin, we have found them also deep in the organism. This confirmed that the Bonghan corpuscles are classified into the superficial Bonghan corpuscles and the profund Bonghan corpuscles according to their location, forms and structure.

A. Anatomical Observations on the Superficial Bonghan Corpuscle

By the vivi-staining method and by the unique external appearance of the Kyunghyul position we could unmistakably single out the Bonghan corpuscles and basically clarify their morphological features. The surface of the Kyunghyul position in the living body is more lustrous than in the non-Kyunghyul position and has a light yellowish colour and the appearance of softness *(Fig. 1)*.

The Bonghan corpuscle located in the reticular layer of the skin in the Kyunghyul position is an oval structure with a long diameter of 1.0-3.0 mm and a short diameter of 0.5-1.0 mm, and its long axis stands vertical to the surface of the skin *(Fig. 2)*.

The bottom-most part of the Bonghan corpuscle is connected with the bundle of blood vessels and Bonghan ducts.

Comparatively large blood vessels run around the Bonghan corpuscle, their branches touching it.

The Bonghan corpuscle and tissues around it are loosely linked with each other, and there is comparatively much tissue fluid in the connective tissues.

The exposed Bonghan corpuscle is more transparent than the tissues around it and is of light yellow colour. When it is dissected, semi-transparent, semi-fluid, tacky Bonghan liquor flows out of it.

B. Anatomical Observations on the Profund Bonghan Corpuscle

It has been established that profund Bonghan corpuscles are located deep in the subcutaneous tissues, in and around the blood and lymphatic vessels and around the internal organs and that they are connected with the superficial Bonghan corpuscles and internal organs by the Bonghan ducts.

The profund Bonghan corpuscle is a long fusiform one (cucumber-shape) with blunt ends or an oval form. It measures 3.0-7.0 mm in long diameter and 0.5-1.0 mm in short diameter.

Both ends of the Bonghan corpuscle are connected with the Bonghan duct.

The profund Bonghan corpuscle looks more compact than the surrounding tissues and has a light yellow colour and a comparatively distinctive features.

Hosts of capillary nets are interwoven around the Bonghan corpuscle.

2. HISTOLOGICAL STRUCTURE OF THE BONGHAN CORPUSCLE

The Bonghan corpuscle is not only an anatomical structure with a distinct boundary but has a very special histological structure hitherto unknown.

The superficial and profund Bonghan corpuscles are similar to each other in that both are linked with the Bonghan ducts and are formed of specific cells, but they have a number of different points in structure.

A. Histological Structure of the Superficial Bonghan Corpuscle

The superficial Bonghan corpuscle comprises the outer layer made up of smooth muscle and the inner substance made up of special cellular elements and many capillary nets *(Fig. 3)*.

The outer layer made up of thick smooth muscle layer can be subdivided into outer circulating layer and inner longitudinal layer according to the direction the muscle fibre runs *(Fig. 4)*.

At the top of the superficial Bonghan corpuscle, the smooth muscle fibres spread out in the connective tissues around them, towards the layer of the epidermis *(Fig. 5)*.

The outer circulating layer is a thin smooth muscle fibre layer surrounding the Bonghan corpuscle. It can be distinctly observed in the fresh specimen that exposes the Bonghan corpuscle *(Fig. 2)*.

The smooth muscle fibres in the outer circulating layer are loosely linked up with the connective tissues around them.

The inner longitudinal layer is a thick smooth muscle layer, its fibres running parallel with the long axis of the Bonghan corpuscle.

Of these fibres the muscle fibres abutting on the inner substance run obliquely up to the region bordering on the inner substance and there they all end together. Therefore their border is distinct.

The thickness of the inner longitudinal layer is not uniform; one part is thicker than the other *(Fig. 6)*.

We observed a peculiar phenomenon when we applied a needle to the centre of the superficial Bonghan corpuscle from the surface of the skin. The needle slowly makes a conical movement, subtly trembling, and at times it moves vertically to the surface of the skin.

This serves to show the characteristic feature of the movement of the Bonghan corpuscle. This phenomenon is named "Kim Se Wook phenomenon" (Phenomenon Kim Se Uc) after its discoverer.

The outer layer becomes gradually thinner as it reaches the bottom of the Bonghan corpuscle; the space between the muscle fibres grows

wider; and between the muscle fibres there is an abundance of fibrous connective tissues rich in elastic fibres. At the bottom of the Bonghan corpuscle these connective tissues girdle the bundle of blood vessels and Bonghan ductules that are linked up with the Bonghan corpuscle.

Argyrophile fibres and capillary vessels are distributed between the smooth muscle fibres of the outer layer *(Fig. 7)*.

These capillary vessels are linked up with the blood vessels of the inner substance and with the blood vessels inside the connective tissues around the Bonghan corpuscle.

In some of the Bonghan corpuscles, one can observe, those comparatively thick blood vessels coming from the inner substance in the upper part pass through the outer layer and flow into the capillary vessels in the group of cells under the epidermis.

The inner substance of the Bonghan corpuscle comprises different kinds of cellular groups, fibrous connective tissues which abound in argyrophile fibres surrounding the cellular groups and well-developed capillary nets.

In all parts of the inner substance, one can observe, chromaffin cells are distributed in rows, around the blood vessel, in small groups or scattered. The size of the chromaffin cell is about 15-25 microns in diameter, its shape being round or oval.

In the centre of the cell is a round nucleus 5-10 microns in diameter, full of chromatin.

The cytoplasm is evenly filled with granules stained yellowish brown by bichromate. Of these cells some have distinct borders and others have indistinct border.

The inner substance has structures distinct from the connective tissues around it and from the chromaffin cells.

These structures have fibrous structures resembling collagenous and elastic fibres and there appear between them small granules that are sometimes basophilic and at other times acidophilic.

In these structures nuclei of different forms are found scattered in large numbers at times and in a very small number at another time *(Fig. 8)*.

In the central and lower parts of the inner substance we observe a follicular structure consisting of characteristic epithelial cells and around it groups of characteristic cells of the smooth-muscle shape.

There are 1-3 follicular structures in a Bonghan corpuscle.

The wall of the follicular structure is made up of layers of epithelial cells of flat, cuboidal or rhombic shape *(Fig. 9)*.

A cell is about 12-20 microns in diameter; its nucleus is round and 5-10 microns in diameter.

The outer part of the follicular structure is thinly enveloped in the connective tissue fibres and there are many capillary vessels around the structure.

Capillary vessels are distributed in the layer of the cells of the follicular structure. Basophilic granules of indefinite forms are often to be found in the cavity of the follicular structure, but no cellular element is to be found.

Peculiar cells of the smooth-muscle shape are observed around the follicular structure. They are of the spindle shape, and their cytoplasm can be deeply stained. They form long lines or small groups.

Between the cells of the smooth-muscle shape there is space, and structures resembling an inter-cell bridge are to be found there *(Fig. 10)*. Nucleus of the cell is small and round, and the chromatin can be deeply stained.

There are dense capillary nets in the inner substance. Particularly in the lower part of it we find many capillaries with wide lumen and in many cases the blood vessels are found full of blood *(Fig. 11)*.

In some of the Bonghan corpuscles we observe the blood vessel in the upper part of the inner substance pass through the outer layer in the direction of the skin. The blood vessel inside the inner substance runs along the bundles of Bonghan ducts and blood vessels hanging on the bottom of the Bonghan corpuscle to join the blood vessels outside the Bonghan corpuscle.

The Bonghan duct and neural element can also be observed inside the inner substance.

There is a small semi-globular mass of cells between the upper part of some superficial Bonghan corpuscles and epidermis and their convex faces look to the Bonghan corpuscle *(Fig. 12)*.

The semi-globular mass of cells is covered with the connective tissue membrane and its border with the epidermis is distinctly discernible. And there are many capillary vessels in the connective tissue membrane.

The border between the cells of this group is distinct; they are about 15-20 microns in diametre; the cytoplasm is bright; the nucleus is round or oval and 8-12 microns in diameter.

The nuclear membrane is clearly observed, the chromatin is comparatively scanty and a small nucleolus is to be seen.

Sometimes pseudo-eosinophilic leucocytes and small cells with curved nuclei make their appearance between cells.

The capillary nets running between cells are connected with the blood vessel coming from the upper part of the superficial Bonghan corpuscle.

It has been proved that the histological structure of the Bonghan corpuscle has nothing in common with the already discovered structures existing in the skin and that it is a new histological structure.

The Bonghan corpuscle is of a peculiar structure clearly distinguishable from the Vater Paccini corpuscle, from the Feuer-Glosser cutaneous glomerules and from the Pinkus hair disk. When we bisect the superficial Bonghan corpuscle in its fresh condition, stain it with acridine-orange and observe it under a luminescent microscope, we find its outer layer tinged with yellowish brown and its inner substance emitting brilliant blue green fluorescence.

B. Histological Structure of the Profund Bonghan Corpuscle

The profund Bonghan corpuscle we have newly discovered is different from the superficial Bonghan corpuscle. It has no outer layer of smooth muscle; it comprises cells of different forms and sizes and basophilic substances.

Cells in the Bonghan corpuscle are arranged in a definite order. At one end of the Bonghan corpuscle are gathered mostly big cells with pale cytoplasm, distinct borders and a pale round nucleus. Cells of this type make up more than 50 per cent of the profund Bonghan corpuscles and without distinct borders they gradually pass on to a group of cells whose nucleus is bigger or smaller than the lymphocyte *(Fig. 13)*.

The chromatin of the nucleus of these cells can be deeply stained, the inner structure of the nucleus is not distinct and its cytoplasm is very small in quantity.

This group of cells is followed gradually by basophilic substances of different shape—granular, rod and thread—big and small.

These basophilic substances which are originally distributed in an irregular manner, take elongated zig-zag shape, scores of microns in length, at the region where Bonghan duct begins. Their arrangement coincides with the course of Bonghan duct *(Fig. 14)*.

We observe well-developed capillary nets in this region of the Bonghan corpuscle where there are many basophilic substances *(Fig. 15)*.

In the profund Bonghan corpuscle one can observe chromaffin cells existing in groups or scattered among other cells *(Fig. 16)*.

The existence of the chromaffin cells in the profund Bonghan corpuscle might present the need of distinguishing them from the paraganglia. But the composition and forms of cells and distribution of the blood vessel in the Bonghan corpuscle show that they are distinct from the paraganglia.

Chapter II

MORPHOLOGY OF THE BONGHAN DUCT

1. ANATOMICAL OBSERVATIONS ON THE BONGHAN DUCT

The Bonghan duct (Ductus Bonghan, a tubular structure linked with the Bonghan corpuscle) is observed in the vital specimen as a semi-transparent and somewhat yellowish thread-shaped structure surrounded with connective tissues, and it contains densely distributed capillary vessels.

Bonghan ducts are linked either with one end of the Bonghan corpuscle (superficial Bonghan corpuscle), or with both ends (profund Bonghan corpuscle), and are distributed in the superficial and profund layers of the body.

The Bonghan ducts in the superficial layer which connect the superficial Bonghan corpuscles, are distributed in the whole body in a definite system, running in the derma. Therefore, we call them "superficial Bonghan ducts."

The Bonghan ducts, however, are not only found in the superficial layer of the body, but are also widely distributed in its profund layer; and it has been newly observed topographically that the Bonghan ducts, running in general along the vessels in all parts of the body—the head, neck, chest, abdomen, limbs, etc.—branch off to all internal organs including the brain.

In this way, the superficial Bonghan duct, which starts from the superficial Bonghan corpuscle enters the body cavity, running through the skin and the muscle layer along the blood vessel, and there, joining with the profund Bonghan duct or profund Bonghan corpuscle, branches off to the relevant organs along the blood vessel.

For instance, it is observed that the Bonghan duct starting from the Bonghan corpuscle at the Joksamri puncture links itself with the profund Bonghan corpuscle after running along the ischiadic nerves and blood vessel bundles, and is distributed in the intestines.

These superficial and profund Bonghan ducts, running outside the vessels generally, keep a definite connection, and are distributed in the corresponding Bonghan corpuscles and organs. So we call them as a whole "extravascular Bonghan ducts."

Moreover, we have also discovered the existence of a structure inside

the vessel, a fact which no one has ever conceived of.

We have established through various experiments that the new structure is the same as the extravascular Bonghan duct in respect both of form and construction.

These structures exist not only in the artery and vein, but also in the heart, in the thoracic duct and lymphatic vessels without exception and they are found in the blood and lymph in all vessels in a state of isolation, not adhering to the vessel wall *(Fig. 17)*.

We decided to call this structure "intravascular Bonghan duct" or "Bak Jung Sik-Bonghan duct" (Ductus Bonghan-Pac Dieng Sic) after the name of its discoverer.

The intravascular Bonghan duct running inside the vessel branches off at the diverging point of the vessel and not only enters into the brain and other internal organs but also links the superficial and profund Bonghan corpuscles with the corresponding internal organs.

The superficial Bonghan duct is linked with the lower end of the superficial Bonghan corpuscle in a unipolar or pseudo-unipolar form, and the profund Bonghan duct is linked in a bipolar form with both ends of the profund Bonghan corpuscle existing in all regions. Semi-fluid and sticky liquid of somewhat yellowish colour is observed flowing in the Bonghan duct.

This liquid is named "Bonghan liquor" (Liquor Bonghan).

2. HISTOLOGICAL STRUCTURE OF THE BONGHAN DUCT

It is established that the extravascular Bonghan duct and intravascular Bonghan duct are of the same histological structure and have a series of features entirely distinct from the histological structure of the blood vessel, nerve, and lymphatic vessel so far known to us.

Each Bonghan duct is formed of a bundle of several Bonghan ductules. The Bonghan ductule has a unique striated structure and its wall is made of very thin endothelial cells.

The diameter of the Bonghan ductule, though it varies according to its functions and the quantity of its content, ranges from 10 microns, when it is thin, to 30-50 microns, when it is thick, in the routine fixed specimen.

When injected with a certain staining solution, the diameter of the Bonghan ductule becomes more enlarged than in its normal state *(Fig. 18)*.

The border of endothelial cells forming the wall of Bonghan ductule, unlike those of the lymphatic and blood vessels, is difficult to discern in