The Removal of Stress at Quails by Humic Substances

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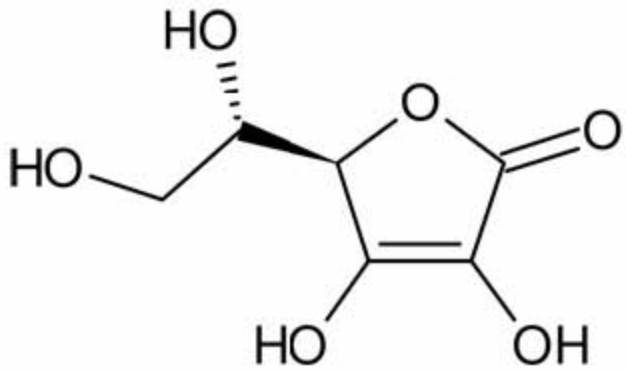
The purpose of this report — to explain adaptogenic properties of humic substances, which were used as biologically active additives at cultivation of quails, the smallest bird from the chicken объяснить

Fowl-like birds or hens (Galliformes (Temminck, 1820)), including quails, are most sensitive to stress from agricultural animals

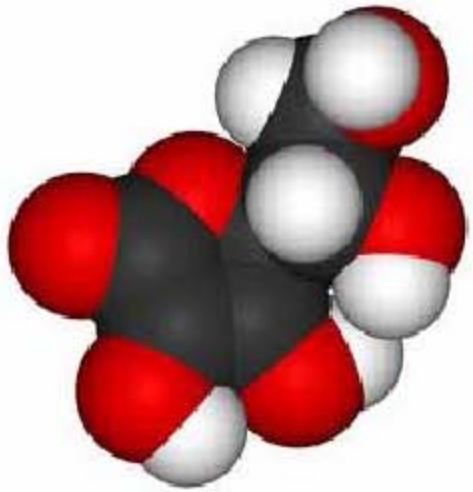
When the birds of this order are in a stressful condition, there are decrease of resistance and efficiency, increase of morbidity and murrain that leads to an economic damage

For the purpose of increase of stress stability, immunity and reparative processes of hens, the ascorbic acid, or vitamin C (*Acidum ascorbinicum*) is very widely used in poultry farming practice

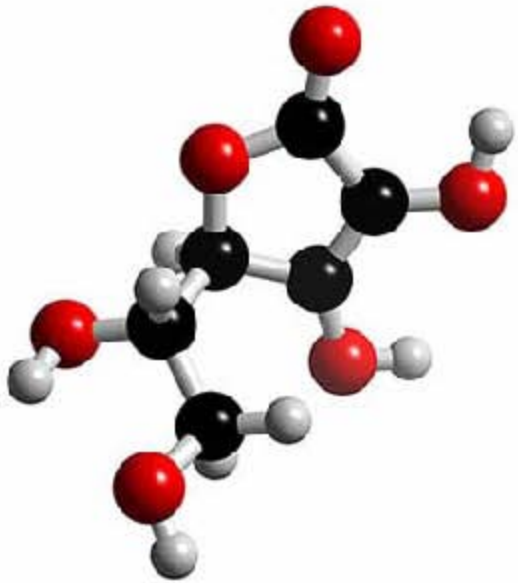


Ascorbic acid regulates

- blood coagulability,
- normalizes capillaries permeability,
- determines anti-inflammatory and antiallergenic action



However overdose of vitamin C can make negative effect on bird's organism, supply of the oxidized compounds of sulphur to organism particularly



Pharmacological preparations on basis of humic substances (HS) are one of effective stresses-proof-readers, or adaptogens

Humic substances — dark-coloured natural high-molecular amphoteric amphiphilic organic nitrogen-containing stochastic redoks-heteropolymers arylglycoproteidic the nature

The biological activity is one of the important properties of HS, including melanin.

Preparations on basis of HS can be used in medicine, veterinary science and animal husbandry as the nonspecific medical product raising resistibility of an organism to influence of various adverse factors.

Medical and veterinary preparations on basis of HS are **nontoxical** (Malama, 1966; Hruleva, 1973; Lotosh, 1991; Parfyonov, Salmina, 1994; the Burayk, Avvakumova, 2003; etc.)

Humic substances, extracted from different objects (river waters, peat, composts, soils, brown coal and so forth), raise resistance of chickens-broilers, young growth of a horned cattle and pigs (Tolpa, Chyzhevsky, 1963; Sokrut et al., 1977; Stepchenko et al., 1983; Wu et al, 2000; Filov and Berkovich, 2007; etc.).

One-day chickens of quails (*Coturnix* sp.) were selected as research objects.

Initially there are two herds: control and test.

A livestock of each herd was 300 pieces.

The control herd of quails was grown up according to existing technology of farm.

The test herd of quails was grown up according to same technology, but biologically active additives on basis of HS and microelements, were added in drinking water.

The total term of supervision was 32 days.

Four herds have been generated after 15 days: two (control and test) on 60 males (cockerels) and two (control and test) on 100 females (chickens).

In all cases chickens contained in cages.

Humic substances have been extracted from earthworm cast compost (vermicompost), which was prepared from cow manure.

Humic substances have been modified by macro- and microelements (P, K, N, Ca, Mg, Fe, Zn, Cu, B, Mn, Co, Mo, I) in strictly certain proportion.

Solutions of HS had neutral reaction (pH ~ 7) and did not contain eggs and larvae of helminthes, and pathogenic forms of microorganisms.

In result of the spent researches it has been established:

- Biologically active additives on basis of HS raised stress stability of both sexes birds;
- Natural death of young quails has not been registered in case of addition in drinking water of HS;
- The weight of birds (both cockerels, and chickens) control and test groups authentically did not differ;
- Ends of feathers of quails control group (both cockerels, and chickens) have been broken off, whereas feathers of quails test group were whole.

The biological activity ГВ shown in beneficial effect HS on growth and development of live organisms, in our opinion, is caused by various properties of these specific connections

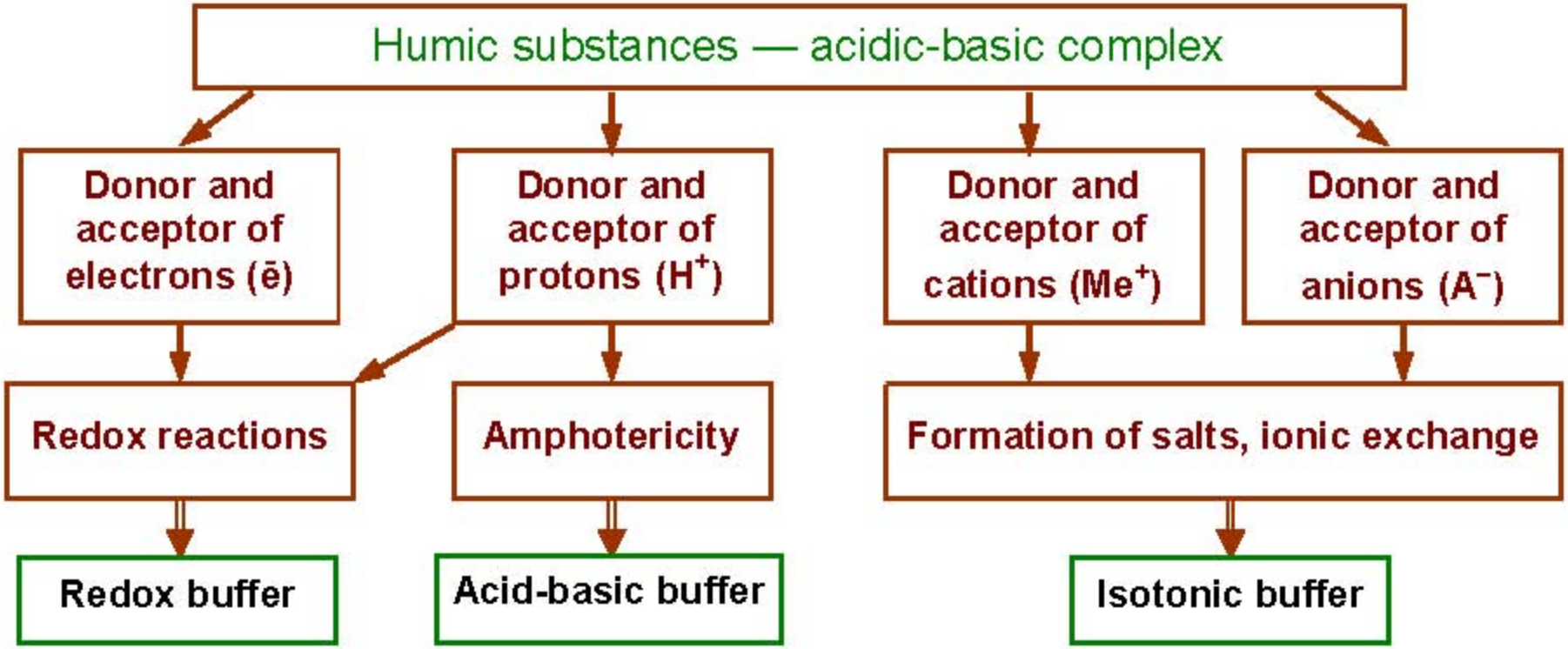
According to our point of view, biological activity of HS is caused:

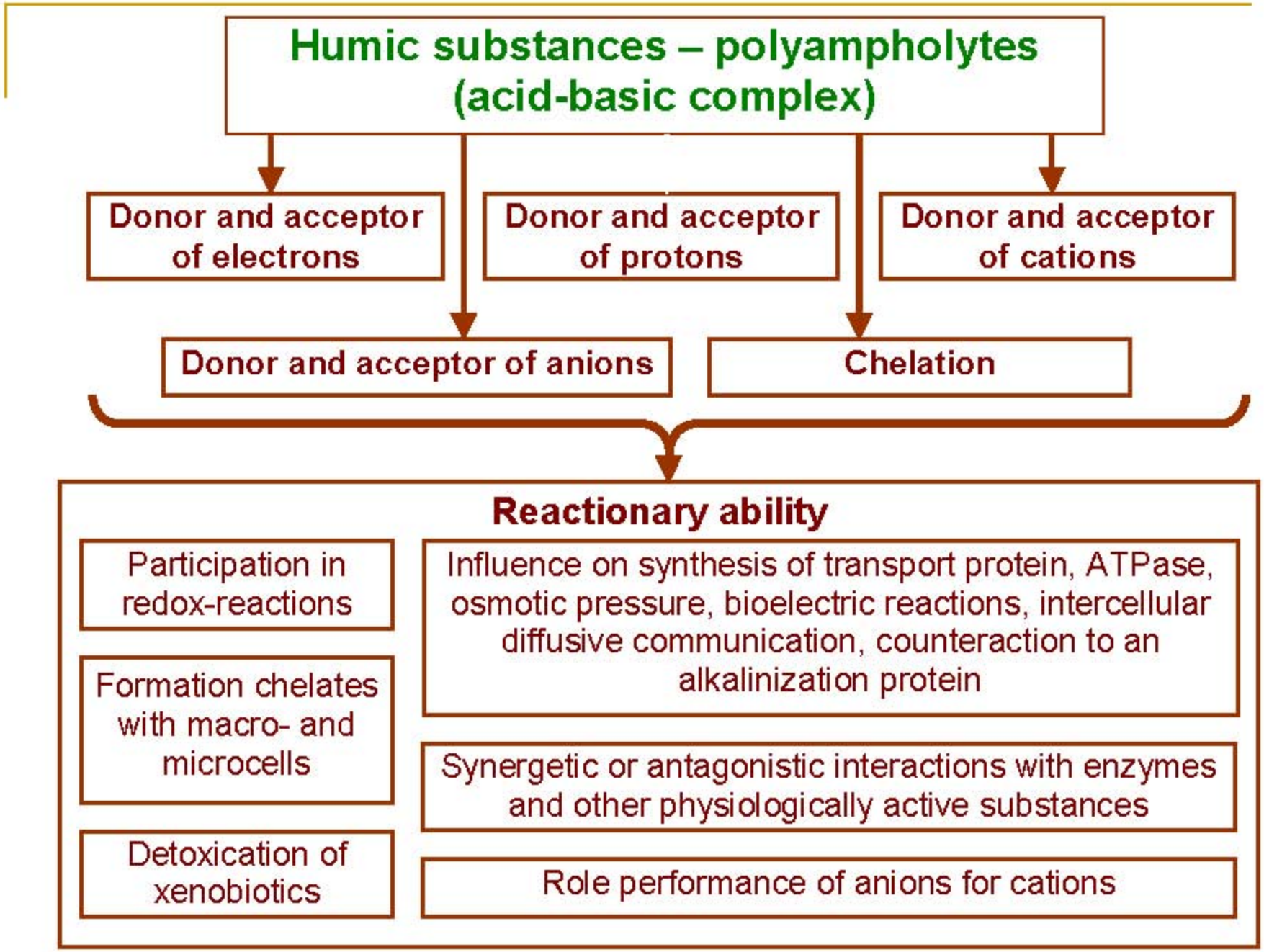
- presence in these connections of various functional groups;
- colloidal properties;
- composition.

Humic substances – multifunctional polyampholytes

Main negative charged groups:	Main positive charged groups:
Carboxyls (–COOH) Spirituous and phenolic hydroxyls (–OH) carbonyls (>C=O) and etc	Amines (–NH_2, –NH–, >N–) Amides (–CO–NH_2) Peptidic (–CO–NH–) Azo groups (–N=N–) and etc

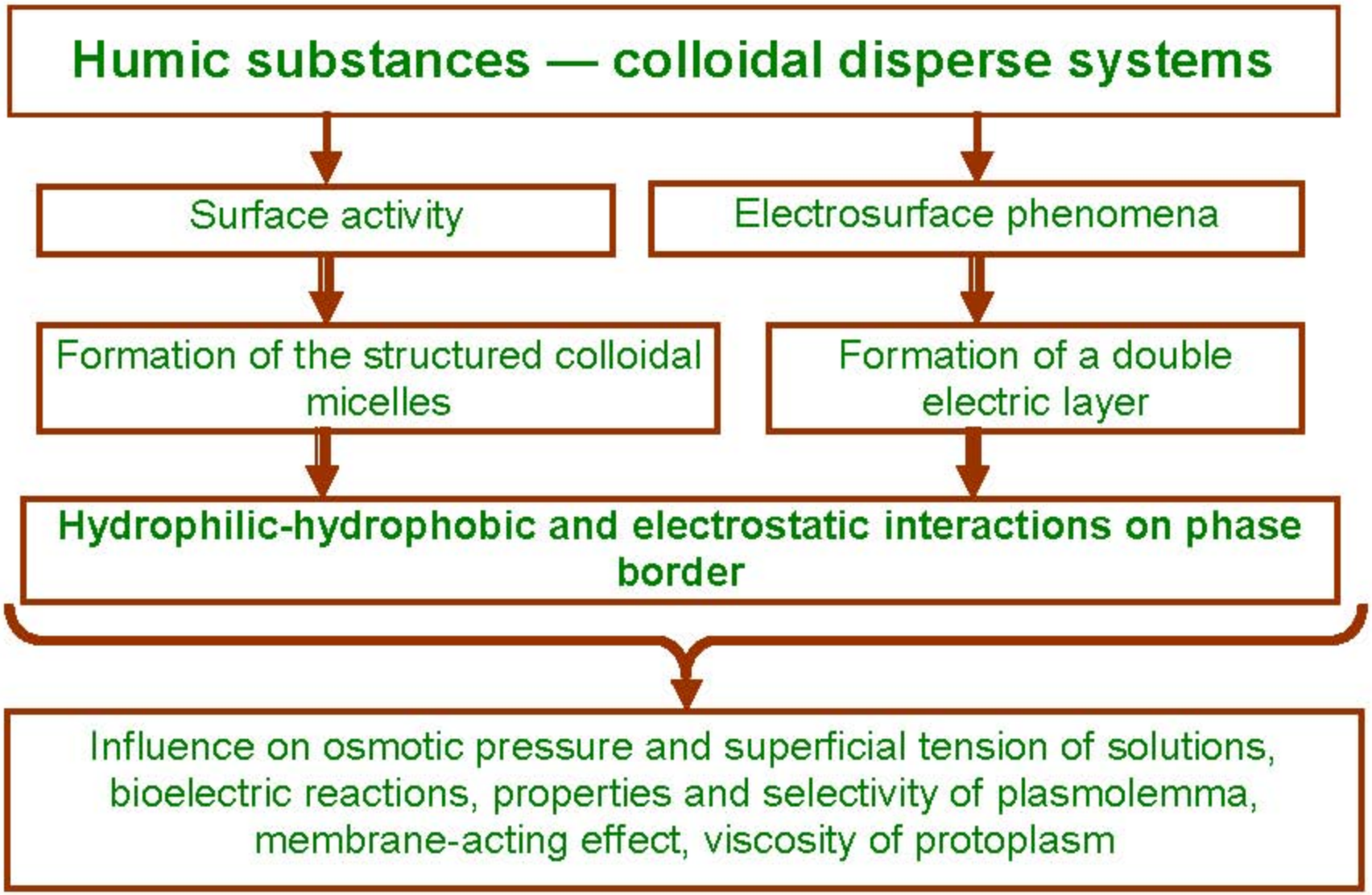
Buffer properties of humic substances



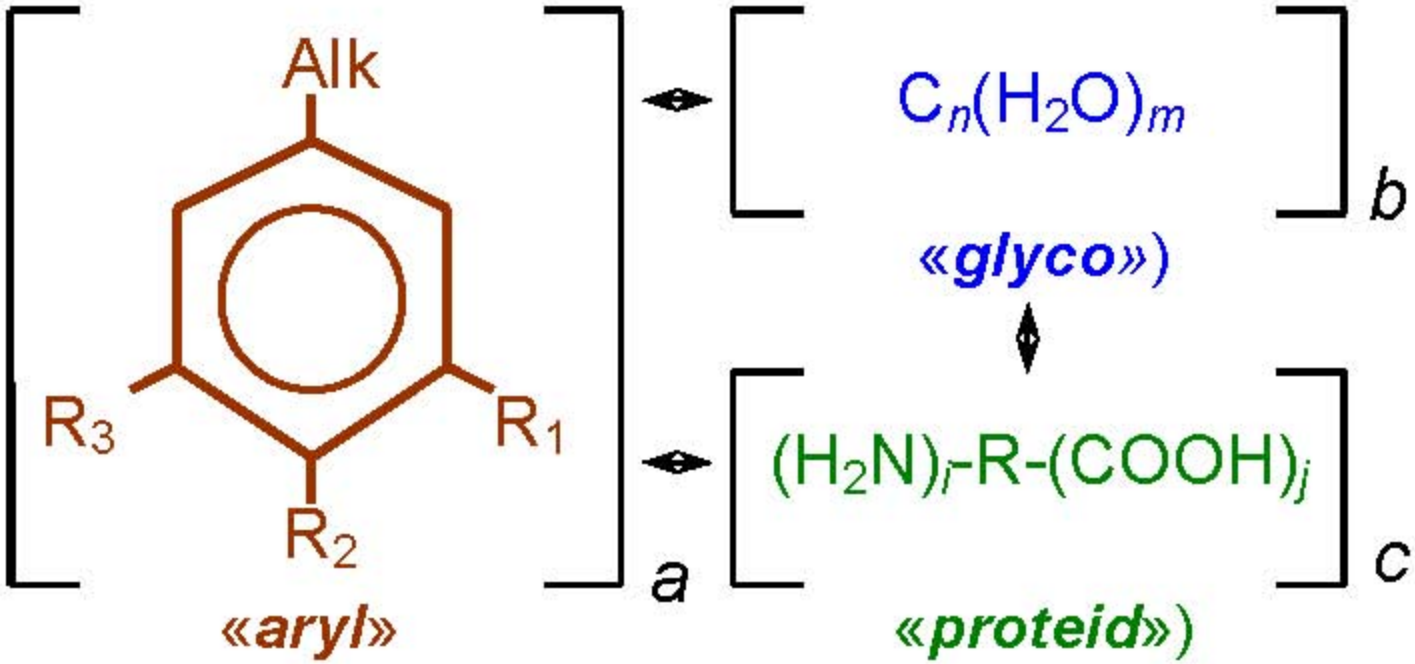

Humic substances – polyampholytes (acid-basic complex)
Donor and acceptor of electrons
Donor and acceptor of protons
Donor and acceptor of cations
Donor and acceptor of anions
Chelation
Reactionary ability
Participation in redox-reactions
Formation chelates with macro- and microcells
Detoxication of xenobiotics
Influence on synthesis of transport protein, ATPase, osmotic pressure, bioelectric reactions, intercellular diffusive communication, counteraction to an alkalinization protein
Synergetic or antagonistic interactions with enzymes and other physiologically active substances
Role performance of anions for cations

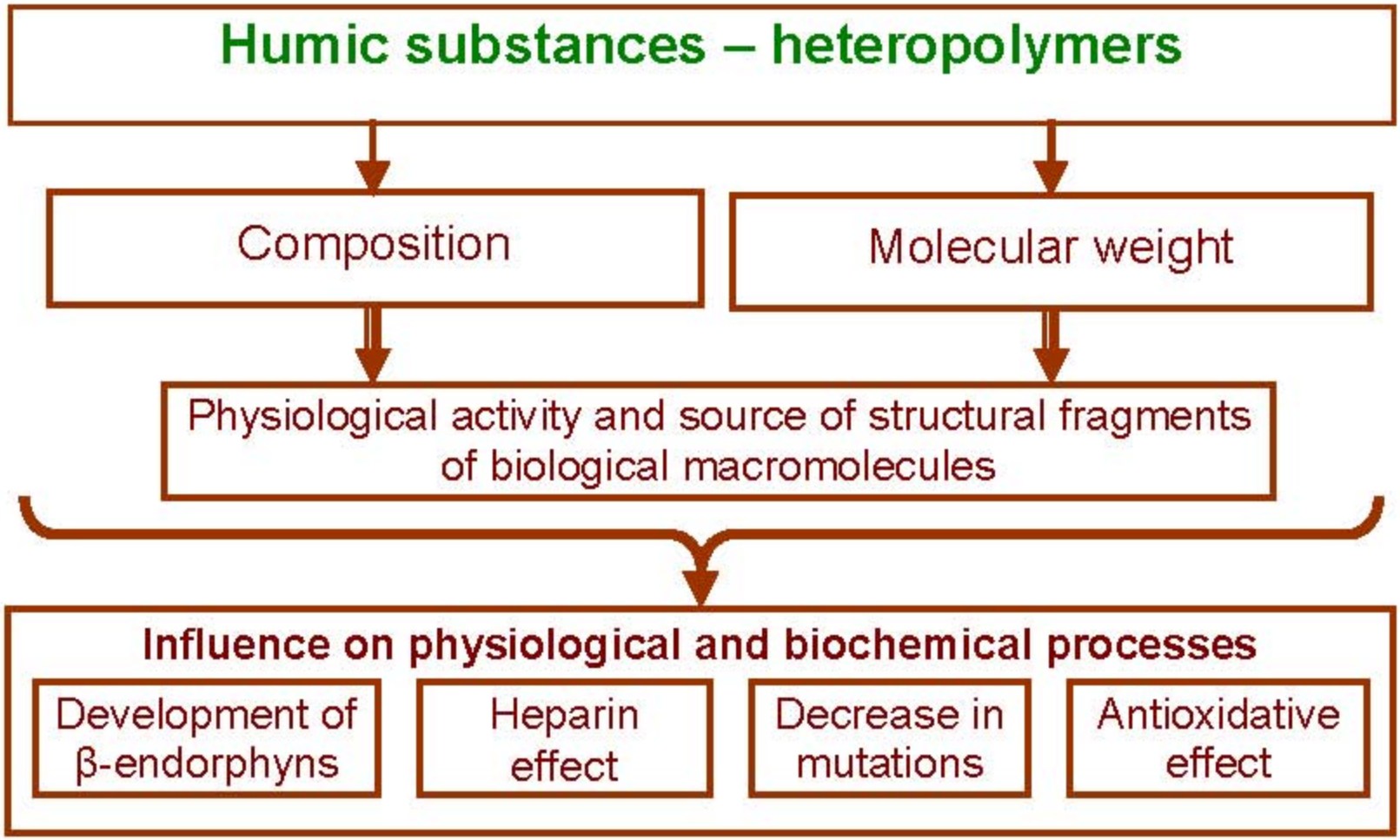
Humic substances — colloidal disperse systems

Diameter of HS dispersed particles is in the range from 10^2 to 10^3 nanometers, i.e. they are **colloids**.


Humic substances — colloidal disperse systems
Surface activity
Electrosurface phenomena
Formation of the structured colloidal micelles
Formation of a double electric layer
Hydrophilic-hydrophobic and electrostatic interactions on phase border
Influence on osmotic pressure and superficial tension of solutions, bioelectric reactions, properties and selectivity of plasmolemma, membrane-acting effect, viscosity of protoplasm

Humic substances — arylglycoproteid heteropolymers




Humic substances – heteropolymers
Composition
Molecular weight
Physiological activity and source of structural fragments of biological macromolecules
Influence on physiological and biochemical processes
Development of β-endorphyns
Heparin effect
Decrease in mutations
Antioxidative effect

Thus, biological activity of HS is integrated display of properties of these connections. On the biochemical and biophysical processes occurring in organisms, those or other physiological effects, in particular stability to stresses allow to predict understanding of HS influence ГВ.

Thank you for your attention!

Спасибо за внимание!