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The ovarian cystic fluid with special reference to its effect upon the reactions of the genital tract.*

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Recent studies¹ on the morphology of the ovarian cysts tend to prove that their structures are, as a rule, not of a follicular origin, but result in most cases from the overgrowth of the embryological remains of the Wolffian duct system, part of which persists in a rudimentary form within the ovaries of mammals.

Viewed from this standpoint, ovarian cysts should not be considered solely as pathological structures. There is a normal element in their existence, the study of which might be of some interest both morphologically and physiologically.

Considerable work has been done on the morphology of the cystic structures but knowledge of the chemical nature and the physiological properties of the fluid contained within the cysts is very fragmentary.

With a hope that such a study might contribute something to a better understanding of the ovarian functions as a whole, we have undertaken an investigation of this problem, the first report of which is given in this preliminary note.

We have studied crude and barkefelded material taken from cysts of human ovaries as well as of ovaries of cows and pigs. Many of the human cysts were of parovarian type, thus excluding the possibility of a follicular origin. In some cases we have tested the fluid of cystic *corpora lutea*. Later we have investigated the effects produced by various constituents of the cystic fluid. Guinea pigs have been used as test animals.

The results obtained so far indicate that the cystic fluid has a decided physiological action and produces rather typical and characteristic effects upon the female genital tract.

* This investigation has been conducted with the aid of The Committee for Research on Sex Problems of the National Research Council.

¹ Papanicolaou, G. N., and Stockard, C. R., Morphology of cystic growths in the ovary and uterus of the guinea pig, *Proc. Soc. Exp. Biol. and Med.*, 1922, **xix**, 401.

These effects may be summarized as follows: There is first a congestive reaction, which begins shortly after the initial injection and involves the entire genital tract from the ovary down to the uterus and the vagina. This congestion is followed by an increased function of the uterine glands, and by hypertrophic activity, giving a comparable picture of the changes occurring normally during the proestrus in the mammalian genital organs.

This increase in blood supply and function tends to shorten the diestrus in normal animals, *i. e.*, the time interval between two oestruses, thus indicating a stimulating effect upon the genital mechanism.

In ovariectomized animals a similar proestrous condition is produced, which as soon as the effect of the injected fluid is past, ends with the destruction of the hypertrophic material in a way, which imitates some of the changes occurring during oestrus and metoestrus. This fact tends to support the view that the catabolic changes characterizing the oestrus in mammals are the result of a decrease in hypertrophic activity of earlier stages, resulting in the final destruction of the over congested structure.

The oestrous mechanism, when properly analyzed, may not be so complicated. An increased blood supply due to congestion may cause an increased function and a more or less hypertrophic condition, which later returns to the normal level.

For this reason it is unsafe to decide definitely on the specificity of all the oestrous like changes produced by the cystic fluid, since many of these effects can be explained as the indirect result of the original congestive condition. We also know that many factors may produce congestion in certain organs, without being of a specific nature. On the other hand we do not entirely exclude the possibility of a specific action.

Different constituents of cystic fluid, *e. g.*, those containing proteinic fractions, lipid fractions, etc., seem to act in somewhat different ways. The reactions described above apply mainly to the lipid extracts. Thus the possibility of attributing these effects to purely proteinic reactions may be entirely excluded.

It seems to us that a thorough study of the different fractions and their effects upon other important organs than the genital tract should be made before the question of specificity can be decided. The same must be said regarding the many

other extracts reported as affecting specifically the genital mechanism. Much of the work on this subject has been based on incomplete studies, and an insufficient knowledge of the genital functions, and as such it cannot be considered as decidedly conclusive.

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The mechanism of feeding in the oyster.

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The food of the oyster consists of minute plants, plant detritus, and animals filtered from the water passing through the gills. In turbid waters much sand and other inorganic matter is accumulated along with the food particles. Bivalve molluscs which live in muddy waters possess highly complicated systems of ciliary tracts with the aid of which some separation of food from dirt does occur.¹ In the oyster this mechanism consists partly in the gills, but mainly in the palps. Water borne particles on striking the gills are entangled in mucus and carried by the cilia of the gill epithelium: (a) ventrad to the groove formed by the ventral margins of the gill lamellae; or, (b) dorsad to the dorsal groove which passes along the bases of the gill filaments.

In these grooves the mucus covered particles are whipped into slime strings which are then carried anteriorly to the posterior margins of the palps. At this point the material may either pass between the deeply grooved and heavily ciliated faces of the palps, and thence toward the mouth, or failing this is pushed off onto the mantle ventrad the edges of the palps. At intervals the material accumulated here is expelled from the mantle chamber by water forced out by quick contractions of the adductor muscle.

When relatively large masses of collected particles are brought to the palps most of these are rejected and pass off onto the

¹ Nelson, T. C., *J. Morph.*, 1918, xxxi, 53.