A Rooster With A Spur on His Head!

Physiology

By Frank Thone

What would you do if you saw a white rooster with a spur growing on his head instead of his heel?

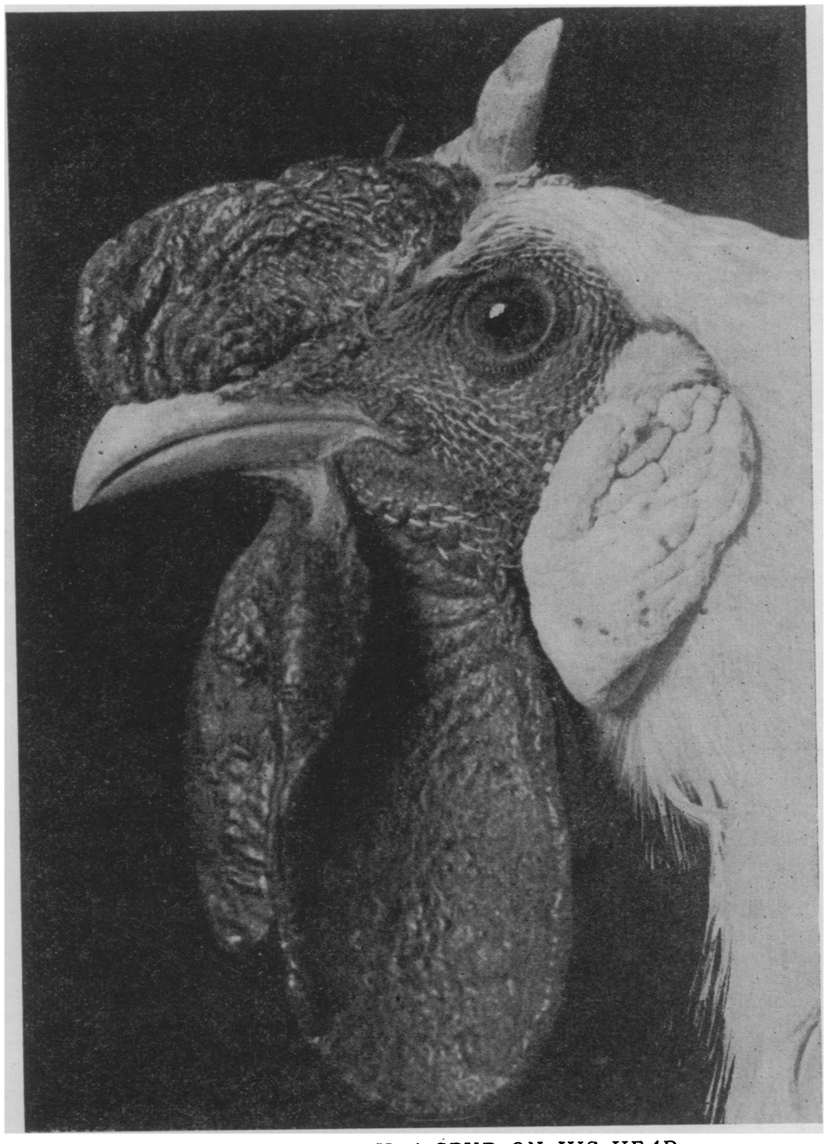
And if he were joined by another strutting fowl with a big red comb growing on his heel instead of his head?

And then another one with a spur sticking straight up on the middle of his back?

The reaction to be expected from the average citizen, on seeing such a spectacle, might well be left to the imagination of jokesmiths who nowadays win a goodly share of their daily bread with "gags" on the difficulties experienced in enforcing certain well-known legislation. Nevertheless, those roosters are real. They exist in the actual flesh, and the soberest total abstainer that ever came out of Kansas can see them without prejudice to his good reputation, if he will go to the laboratories of the zoology department of the University of Pittsburgh.

These fowl, to be sure, didn't get that way naturally. They didn't voluntarily turn themselves into unicorns, nor trim their legs with their natural head-ornaments as the result of a gallinaceous whim. In the too common political phrase, it's all a graft. Or rather, it's all a series of grafts. Grafts in the very literal sense, for these spurs and combs and patches of tissue generally have been removed from their original points of growth by surgical operation and transplanted to alien localities where they have taken hold and are growing just as though they had been there from the beginning. They are animal grafts, just as the tops of our apple and plum and pear trees are plant grafts.

The three weird brethren in feathers are only samples of the queer birds to be seen in this zoological laboratory. There are other roosters there with spurs and combs sticking out of their anatomy at all sorts of unexpected places. A comb on a drumstick or a spur on a wing or a wishbone are commonplaces in this fantastic menagerie. Less conspicuous but not less interesting from the scientific point of view are other transplantations of skin and feathers only, from one part of a fowl to another place on its own body, or to the body of one of its penmates.



A ROOSTER WITH A SPUR ON HIS HEAD

For this strange flock of chickens has not had its external anatomy thus juggled merely to make the observer doubt his senses or his sobriety. It is a part of a well-conceived and carefully carried out plan of scientific research. Its aim is to get conclusive data on one of the most-debated questions in physiology, and upon its final outcome—for the experiments are still in progress—will depend the fate of certain procedures practiced on man himself, especially in the fields of skin grafting and plastic surgery.

Certainly the experiments were never started with the deliberate purpose of creating a sensation. The man whose skill and patience have made them a success, A. W. Kozelka, is retiring to the point of outright painful shyness; it is only when one gets him started on his beloved subject of tissue transplantation that his reserve melts and he warms into enthusiasm. And Prof. H. H. Collins, under whom Mr. Kozelka is working as a graduate student, has been quietly doing fundamental work on other phases of the same problem for many years without ever attempting to maneuver himself into the limelight.

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A Rooster with a Spur on His Head—*Continued*

When Mr. Kozelka began transplanting spurs and combs and bits of integument around on his chickens he was really asking them questions. He was asking them whether they could grow these things in places where they were not used to growing. He was also asking them whether they could trade spurs, combs or bits of hide, and make their new acquisitions as much a part of their natural selves as were the old pieces with which they parted while they were stretched out unconscious under the ether. For there has been much dispute among scientific men whether such transplants of animal tissue could be made successfully, either from place to place on a given animal or from one animal to another. And Mr. Kozelka wanted a real answer, not just some more half-answers that would only lead to more disputes.

The reason for his success in growing spurs and combs in seemingly unnatural places is that fundamentally these things are parts of the skin itself, just as in man the hair on his head and the nails on his fingers and toes and the pink mucous lining of his nose and mouth are all parts of the skin-tissue system. From this point of view, a rooster's spur might be regarded as an overgrown callous spot, and his comb as a kind of ornamental wart. So a transplanted spur is after all only a transplanted bit of skin; somewhat specialized skin, to be sure, but still skin. Thus the whole nine-days' wonder of the Pittsburgh laboratories resolves itself into a research on skin grafting.

But why bother with skin grafting? Hasn't that been done for many years? Isn't it a closed question?

That is just the point. Skin grafting is not a closed question. Many surgeons refuse to perform such operations, at least when they involve the transfer of skin from one person to another, claiming that such transplants never "take".

Here obviously is an important and practical issue. If skin transplants do not "take", then the heroic volunteers who offer themselves to the surgeon's knife for the sake of a friend are suffering needlessly. But if they do, and the surgeon hesitates to perform the operation, then the patient suffers needlessly.

Hence Mr. Kozelka's surgical questions to his fowls. The first one was, "Can you grow on any part of your body a piece of skin or skin-tissue taken from any other part?" To this he received a decided "Yes." A bit of skin lifted from the top of a young chick's head and planted on its leg took hold easily, and in time developed into a typical comb, in spite of its being where the spur ought to be. A bit of skin bearing the undeveloped tissue-bud of a spur planted on top of the head likewise took hold and as the fowl grew up developed into a full-grown spur, in spite of its being where the comb ought to be. In a very large proportion of cases, these "autografts" of skin from place to place on the same animal's body have been entirely successful and have lived on indefinitely.

When it came to the second question, however, the answer was by no means so emphatic. This question was, "Can you take on a bit of the skin of another fowl of the same breed, and make it a part of your own skin system?" Such alien transplants are known as "homoiografts". Sixty-nine cases of homoiografts took hold and grew into place, but of them all only 18 survived until the fowl carrying them had grown to maturity. On all the rest the homoiograft tissue has gradually dwindled, being absorbed by the surrounding tissue into which it had been transplanted, until finally it disappeared altogether, leaving only a scar. It is harder, also, to get one of these homoiografts to take hold in the first place; autografts seem to find themselves more at home on flesh exactly identical with that which they knew in the first days of their life. There seems, indeed, to be a positive antagonism between the homoiograft and the tissues into which it is planted. The latter frequently swell up, develop an abnormally full net work of blood vessels and in general get inflamed, which is the normally antagonistic reaction of the body to an alien invader.

In his experiments, Mr. Kozelka partly got around this tissue-antagonism difficulty by making most of his homoiografts between fowls closely related to each other. Physiological antagonism of any sort is due to chemical differences between blood substances of the animal concerned and the materials invading them. Skin from one's own brother might reasonably be expected to be more nearly related chemically to one's body than skin from a total outsider, and thus more likely to be accepted by the tissues without the antagonism-reaction.

The traditional conservatism of females was observed in these experiments in a rather striking way. Combs of hens would grow all right if planted somewhere else on their original owners' bodies, but they did not grow to the full size they would have achieved had they remained on top of the head. Similarly, the much-reduced nubbins of spurs which most hens have could not be transplanted successfully beyond the limits of the scaly part of the leg. They would grow there all right, but planted on the drumstick or on any other part of the body they remained juvenile. Skin bearing feathers, however, could be shifted around pretty much at will, and grew normally wherever it succeeded in taking hold at all.

The carefree and cheerful male, however, was not to be discouraged by finding his spurs in the wrong place. He went ahead and grew them anyhow, whether they were on his heels or his head. Spurs are the mark of full-blooded, lusty roosterhood, and must be brought to full growth no matter where the fortunes of war or of surgery happen to put them. It is not recorded, however, whether any of these "unicorn" roosters have learned to use their head-spurs for horns, and to fight after the manner of billy-goats.

A source of never-ending wonder to strangers in the laboratory is the apparent cheerful indifference with which these chickens accept their strange condition, and above all the ease with which they recover from the operations to which they are subjected. The ether leaves them rather groggy for a time, but so far as the cut and bandaged parts of their anatomy are concerned, they do not seem even to be conscious that anything has happened to them.

Apparently the answer is just that. They really are not conscious that anything has happened to them. Chickens seemingly haven't got enough brains to have any imagination, and it is imagination that knocks a man out when he is hurt or thinks he is going to be. A chicken neither remembers past discomfort nor anticipates future troubles; so it goes most unconcernedly through experiences that would make us humans worry ourselves into hospital beds. An operated chick is usually on its feet within a few minutes after it recovers from the anesthetic, and the (*Turn to page 37*)

Freak Roosters—*Cont'd*

only outcry one hears from it arises at feeding time if its crushed grain is not promptly forthcoming. Mice and rats and guinea pigs and even dogs in the laboratories seem to have the same indifference to what has happened or yet may happen, and they are thereby able to recover in hours— or even minutes — from operations that would put the more imaginative human species into the convalescent ward for days or weeks. It is perhaps fortunate for them that this is so, for animals in nature, and even in domestication, are called upon very often to endure and recover from injuries compared with which the most radical laboratory experiments are mere fleabites. It is not fashionable any longer to speak as our grandfathers spoke, of "the marvellous provisions of Nature"; but this state of affairs certainly looks like something of the sort.

In the meantime, undisturbed by philosophical speculations over the indifference of his chicks to what happens to them, Mr. Kozelka carries on. His experiments still have a long course to run, but enough has been done already to give a good glimpse of daylight. Tissue transplants from place to place on the same animal are practicable, even relatively easy. Taken from one animal and put on another they are not so easy, though they can still be made in a fair proportion of tries, and at least a part of them will survive the. attempts of the "native" tissues to absorb and displace them. These things are now being weighed and evaluated by physiologists and watched by surgeons; tomorrow may see the beginnings of their application to our own needs.

Science News-Letter, July 21, 1928

If one common housefly and all his descendants flourished, the family would number 1,096,181,249,320,720,000,000,000,000 by the end of the season.

Chinchilla rabbits, which are becoming popular as fur animals, must be bred for both fur and food if they are to be profitable, government experts warn.

Triplets occur in families about once in 6,000 births.

New Yellowstone Theory

Geology

A new history of the Grand Canyon of the Yellowstone will need to be written as a result of geological research by members of the Princeton Summer School of Geology and Natural Resources who have just completed an investigation of the canyon and the area bordering this great natural ditch.

When the first transcontinental expedition of Princeton geologists, traveling in the special geological Pullman "Princeton", as well as students, visited Yellowstone Park in 1926 they obtained the first hints that the origin and history of the canyon needed reexamination and possible revision. This year the area was restudied by the geologists under the leadership of Prof. R. M. Field, director of the expedition, and Prof. O. T. Jones of the University of Manchester, England, one of the foreign guests.

During the Tertiary period, the age of mammals, some tens of millions of years ago, the geologists concluded, a canyon of nearly the present dimensions was excavated. This great waterworn depression was later blocked by volcanic lavas near its lower end and filled to the brim with sediments. The present canyon from the upper falls of the Yellowstone to the lower end was largely reexcavated only a few millions of years ago. The digging of the new canyon by the river's water has taken place since the great Glacial epoch, when ice covered much of America.

"One of the most striking conclusions resulting from this discovery," Prof. Field declared today, "is the fact that the lower fall of the Yellowstone has occupied its present position since the later Tertiary period when the first excavation of the canyon was made."

Profs. Field and Jones will publish further details of their discoveries in the fall after the return of the expedition which is now enroute to the Pacific coast. The new information obtained suggests to these experts that the stratigraphy and petrography of this frequently visited region needs revision upon the maps and in the geological records.

Science News-Letter, July 21, 1928

In a survey of state prisons in Kentucky it was found that almost one-third of the male prisoners had dependent children under 16 years old at the time they were sentenced.

Nature Ramblings

By Frank Thone

Natural History

Wild Cherries

Last spring the wild cherry trees helped to make the countryside glad with bloom; now their small dark red or black fruits are giving the summer an adornment proper to its more sultry beauty. Most species of wild cherry bear their fruits singly or in small clusters, as do the cultivated varieties, but the black cherry, which is perhaps the most widespread and abundant member of the genus, offers them on long strings or racemes. The trees are usually very prolific too, so that in late July and August there is almost as much of black on their twigs as there is of green. The fruits of the wild cherry, like most wild fruits, are not palatable to tastes trained on the milder products of cultivated orchards. They have too much "pucker" in them, due to their high tannin content, and their acidity is usually rather high as well. But a few of them, added judiciously to conserves or marmalade, will give a tang and spice that many persons like.

And whether or not supercilious man condescends to harvest these free-will offerings of nature, the birds at least do not despise them. A wild cherry tree is a banquet table for many feathered species. In return for the feast, the tree collects free transportation for its seeds. These latter, being hard and indigestible, pass uninjured through the digestive tracts of their devourers, and may be dropped hundreds of yards, or even several miles from the place of their origin. Thus it comes to pass that in the wild thickets that spring up in clearings or burned places in the woods, and in the similar growth that rises wherever there is a fence for the birds to perch on, there are always some wild cherry trees.

Science News-Letter, July 21, 1928