

they could support on a continuous-yield basis in times of full rain. And during the present dry half of the irregularly recurring climatic cycle, those mouths, desperate with starvation, have skinned the grass down to the very roots. There is nothing left to eat, nothing left to burn.

Perhaps there are plainsmen who still remember old times with something of a pang—who would not be wholly sorry to see an old-fashioned prairie fire again, because if it did symbolize destruction, it also symbolized a high abundance even as did the "whole burnt offerings" of ancient Israel.

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ground for hidden ore. Plots constructed in this way give numerous clues to what is going on inside the animal.

It has been found, moreover, that readings taken from any two points on the body reflect not only what is going on in the immediate vicinity of those points but also the *total* activity of the animal. Every animal so far studied produces electricity in amounts that can be accurately measured.

The data suggest that each animal possesses a dynamic electrical picture which, although constantly changing in minor ways, nevertheless, possesses recognizable individual characteristics.

There is a very real possibility that this electrical picture or electrodynamic field may provide the explanation of the amazing capacity of an animal to grow from a single egg into a multiplexed adult in the midst of the rapidly changing chemistry of development.

Hope For New Clue

It may be that in these electrical studies will be found the clue to the mechanisms by means of which the chromosomes determine such things as shape of face and color of eyes, and that "animal electricity" is the expression of a fundamental electrical field acting as a guiding and controlling factor in the development of any individual.

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PHYSIOLOGY

Electrical Changes in Body Controlling Factor in Growth

By PROF. H. S. BURR, Yale University School of Medicine

IN ALL probability, wherever there is life, electrical phenomena are to be found. Electrical studies of living plants and animals have added much to our information since Galvani first published his description of "Animal Electricity."

Great progress has been made in the study of the nervous system through the adaptation of recent commercial radio apparatus to this use. However, it has been very difficult to determine with precision the nature of the electrical currents which have been noted in association with living animals and plants since most of the meters used require current for their operation, and hence have complicated the results by the effects of changes in resistance.

To overcome these difficulties, a vacuum tube microvoltmeter has been developed which is stable, draws no current and is, therefore, independent of resistance. With this instrument, differences as small as a millionth of a volt can be read accurately. Reproducible voltage differences of a characteristic order in fishes, salamanders, frogs, chicks, rats and mice, cats, rabbits, dogs, monkeys and man have been obtained.

Accompanying Life Processes

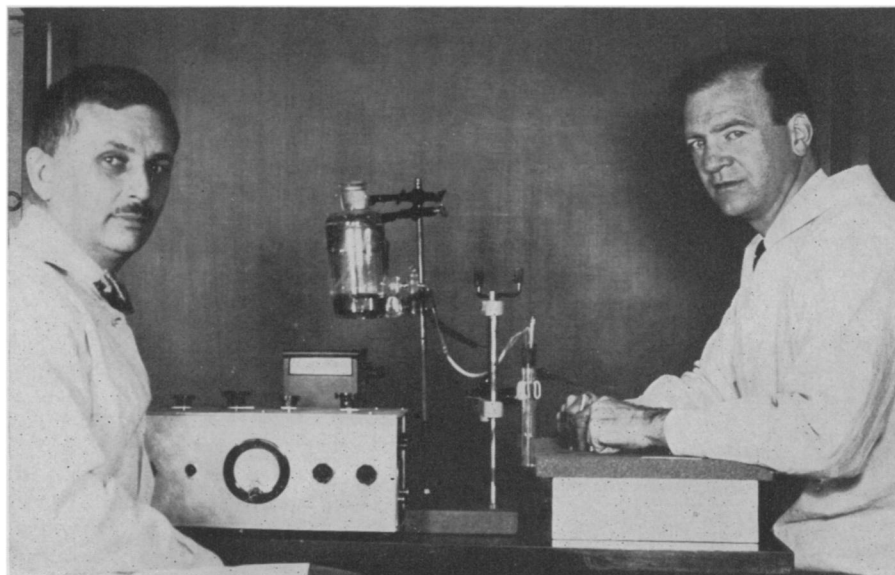
Moreover, it has been shown that these voltage differences are very closely associated with minute variations in the living process. The instant of ovulation in the intact cat and rabbit and an electrical rhythm in the menstrual cycle in women has been recorded. A marked change associated with the appearance of cancer and a definite correlation with growth during the embryonic and adult life have been observed.

In a rather surprising way it has been found that the voltages developed are not the result of chaotic currents but of

currents organized into a very definite pattern which is characteristic of the species and may show the same individual differences as do series of finger prints. With this instrument, it is possible to write a kind of electrical formula for the individual animal.

"Prospect" the Body

In addition, it is possible to study electrically a live animal with very great accuracy without having to kill it for analysis or without in any real sense modifying its activities. In fact, it is possible to prospect the body of an animal for voltage differences much as a geophysicist maps the surface of the



STUDY BODY CURRENTS

How Yale experimenters study electricity of nervous system by adapting radio apparatus to this purpose. Prof. H. S. Burr, left, is ready to make measurements upon Dr. R. G. Meader, right, who has his fingers in salt dishes to make electrical contact between his body and the sensitive instruments. Taking of readings is accomplished simply and without discomfort to the person being tested.