IN THE LABORATORY

Production of Quantitative Infections With the Filariae of the Cotton Rat[1]

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Progress in the study of filariasis has long been retarded by the lack of an animal that can be infected in the laboratory. A step forward was made last year with the production of mass infections with *Litomosoides carinii*, the filaria of the cotton rat. Experiments recently completed in this laboratory have shown that it is now possible to produce quantitative infections with these worms, *i.e.* infections made with a known number of larvae and thus limited to a definite maximum size. This step opens the way for a new approach to the study of filariasis. In chemotherapeutic studies parallel series of treated and control animals infected with an approximately equal number of worms, all of which are of the same age, make possible more accurate determinations than with the wild-caught or mass-infected animals previously used. Moreover, the susceptibility of various species of animals, the possibility of a changing susceptibility with advancing age, and other phases of the immune response can now be studied by this method.

The details of the method are simple. Tropical rat mites, *Liponyssus bacoti* are raised on a white rat in a metal tank surrounded by an oil-filled moat. After three or four weeks an initial 50 mites will have produced a large colony, and an infected cotton rat is then substituted for the white rat. Ten days later this rat is removed, and in a few days the mites begin to migrate up the sides of the container. They are transferred by suction to vials, in which they are held until at least two weeks after their first opportunity for an infected blood meal. They are then examined in saline under a cover glass, and those containing larvae are placed in separate bottles. When a sufficient number is available, each mite is held in a drop of saline under a dissecting microscope by laying the tip of a bent needle across the thorax, and the tip of the abdomen is removed with a knife-edged needle. The viscera are expressed through this opening and the larvae teased free in the saline. These are transferred with a fine pipette to a drop of saline in the "hookworm larva counting slide" designed by the writer and listed by Arthur H. Thomas Company. In this slide the larvae can be easily counted as they accumulate from successive dissections. When sufficient are present, they are drawn from the slide into a #15 hypodermic needle, 3½ inches long. Care is taken not to draw them through the needle into the attached tuberculin syringe, but the syringe contains saline to rinse the larvae out of the needle when the injection is given under the skin of the back. A check against loss is made by again rinsing the needle into the slide.

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A Simple Method for Administering Nebulized Penicillin

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Increasing recognition of the advantages of the inhalation treatment with penicillin vapor has led to the development of many complicated devices. This communication is to suggest a simple apparatus for nebulizing and administering penicillin.

Advantage has been taken of the fact that the De Vilbiss nebulizer #40 has an aperture which exactly fits the BLB "oxygen mask" type A-8-A arctic, manufactured by the Ohio Chemical Manufacturing Company. The mask's rebreathing bag and its side arm are removed, and the glass nebulizer is inserted into the tube leading to the mask. The lower end of the nebulizer is connected to a source of compressed air or oxygen. A T-tube is inserted in the compressed air line so that the patient can control the pressure in the system. This is done by closing the T-tube with the finger, on inspiration, and removing it during expiration. Using a flow of 6 or 7 l. of oxygen/minute, or its equivalent in compressed air, results in nebulization of watery penicillin solutions which are then inhaled via the mask through the nose or mouth with complete comfort to the patient. The simplicity and availability of this apparatus make the administration of penicillin vapor convenient and foolproof.

An Interphase Analyzer of the Electroencephalogram[1]

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Interpretation of the electroencephalogram (EEG) is made at present almost entirely by visual estimate of wave forms, frequencies, phase, and amplitude relationships which are obtained from different areas of the cerebral cortex. Much of the interpretation of these records must always be done in this manner, for as an X-ray diagnosis, for example, there is no substitute for the skilled and experienced interpreter. But it is obvious that any additional objective measure of significant factors in these records would be of value not only in interpreting individual records but in comparing standards from the different laboratories now being established in many countries.

With this in mind, there have been a number of attempts to develop automatic or semiautomatic analyzers of these tracings. Frequency analyses, both manual (*1–4*) and automatic,

[1] Aided by a grant from the New York Foundation.

are at present available, but these can be used only as research tools because of the complexity of instrumentation and assemblage of data. The present interphase analyzer, in contrast, requires little additional time or training and affords a measure of a single variable which is practically significant.

The apparatus has been designed in such a manner that it can be connected between the pre- and power amplifiers of a 6-channel Grass electroencephalograph without alteration of standard equipment. Switches are provided to connect the analyzer with the EEG, or to disconnect it, at will. When disconnected, the usual 6-channel EEG record is obtained. When connected, 4 of the 6 channels continue to record the usual EEG while the remaining channels produce the phase analysis.

In the analyzer, the push-pull alternating potentials obtained from the preamplifiers are converted to single-ended operation (Fig. 1). This is accomplished by inverting half of

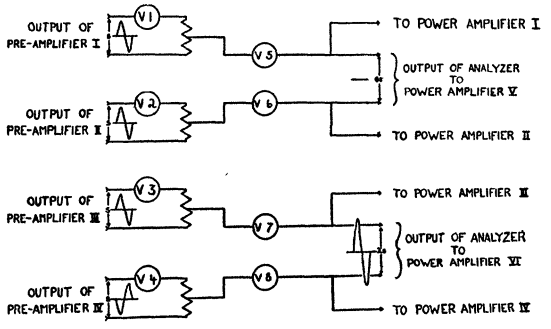

FIG. 1. Diagram of circuits of interphase analyzer.

the varying push-pull voltage of each of the preamplifiers of the first 4 channels. Both uninverted and inverted halves of the signal of each channel are then connected to ½-megohm resistors, and the single-ended output is taken from the junction of these. The single-ended output of channels 1 and 2 is fed to the grids of tubes V5 and V6, respectively; that of channels 3 and 4, to tubes V7 and V8, respectively. It will be noted that tubes V5 and V6 as well as V7 and V8 are operating in push-pull again. The output of the push-pull circuit V5 and V6 is then the analyzer voltage which is recorded as the instantaneous voltage differences between the activity of channel 1 and that of channel 2 on channel 5. Similarly, the output of the circuit V7 and V8 is the analyzed record of the simultaneous potential differences between the activity of channel 3 and that of channel 4, and appears on the record of channel 6.

The operation of the instrument is best shown by records of the two possible extremes. Such records are always made as part of the calibration procedure during analysis of all EEG's. These limiting conditions are demonstrated in Fig. 1. Channels 1 through 4 are here recording from a single cortical area. Channel 5 shows the resultant analysis of the in-phase activity between channels 1 and 2. Since all activity is simultaneously in-phase, the output is zero, or a straight line on the record. Channel 6 depicts the analysis of the activity of channels 3 and 4 shown in complete phase opposition. The output here is double the amplitude of the original activity. This is true only if activity of both areas is approximately of the same amplitude. If a marked difference in amplitude exists, it must be taken into account by considering the base line to be the difference in amplitude of the two areas under analysis rather than zero. In the analyzer, frequency and phase differences are detected only by means of phase discrimination, the amount of frequency or phase discrepancy being expressed as phase shift. Hence, focal differences either in phase or frequency become significant.

Practically, it is well known that phase relationships between cortical areas are important. However, using the ordinary visual interpretation, their detection is limited to low frequencies within the range of alpha activity or less, since above that level the resolving power of the eye, the speed of recording, and the accuracy of pen alignment is too limited for detection of phase reversals. In these higher frequency ranges, the analyzer can show phase shifts or reversals which are significant. Furthermore, in many instances in which the EEG suggests a focus which is indefinite and in which phase reversals may be present only temporarily, clear delineation by use of the analyzer is often possible.

References

1. BRAZIER, M. A. B., and FINESINGER, J. E. *J. clin. Invest.*, 1944, **23**, 303–311.
2. DAVISON, G. D., and WALTER, W. G. *J. Neurol. Neurosurg. Psychiat.*, 1944, **7**, 119–133; 1945, **8**, 61–64.
3. GIBBS, F. A., and GRASS, A. M. *Science*, 1947, **105**, 132–134.
4. GRASS, A. M., and GIBBS, F. A. *J. Neurophysiol.*, 1938, **1**, 521–526.

Effective Copying of Kymographic Records

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The copying of kymographic or other smoked-paper records has many intrinsic difficulties well known to workers therewith. Direct copying can be done, using the record as the negative, and with such papers as Insurance Bromide grade RR (Eastman) fairly good results are obtainable. However, these as a general rule are not satisfactory for publication purposes.

Introduction during the war of new types of waterproof papers has entirely changed this situation, and copies of all records may be made with the greatest possible ease and success. The writer has experimented with several types of material including Resisto (Eastman) and some ex-Army material, but by far the best so far encountered is Grade 4 QUIK.[1] This material behaves like a medium chloride paper and is exceedingly tolerant of exposure variation, which is around 30 seconds for an ordinary tracing using 5 daylight bulbs dimmed to about half strength. Development is with ordinary hydroquinone 1;;1 developer and takes about 1–2 minutes. Fixing with fresh material may be complete within 3 minutes, and washing in free flowing water in 10 minutes. As the base is quite waterproof, drying is very fast, and not much curling occurs.

In order to facilitate printing and eliminate a great many unavoidable variations in smoking and varnishing, it is well to brush the back of the record, over the parts required for copying, with a mixture of light petroleum. This can best be done visually over the safelight in the printing box. Providing there is no actual excess of oil, no difficulties are occasioned thereby,

[1] Obtainable from Grant Photo Products, 401 4th Avenue, New York.