were obtained from reading lines #1 and #2, portions of which are shown in Fig. 2.

Two major observations may be made from these data. First, there was a definite and distinct reduction in the number of muscle action potentials as the response time became longer. This was due, we presume, to an increasing boredom, sleepiness, etc. on the part of the subject. Secondly, the absolute variability markedly decreased with decreasing motor efficiency. The slight variation in the level of muscle activity for the last four response-time values and the NR (no-response) category is not as important as it may appear, in view of the fact that the average muscle spike count is about three per second and indicates an almost completely relaxed status of

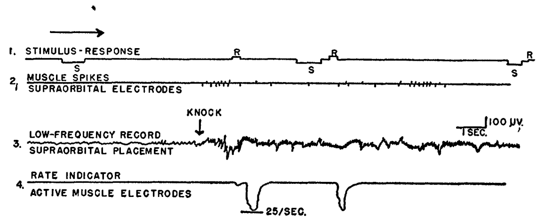

FIG. 2. Tracing of record showing transition from sleep to normal alertness.

the muscles involved. In the case of the NR category, the subject was asleep, and in most cases the stimulus served to awaken the subject on the first presentation, the response time rapidly approaching normal in subsequent presentations.

Recording line #3 (low-frequency record) in Fig. 2, although originating from the same supraorbital electrodes as line #2

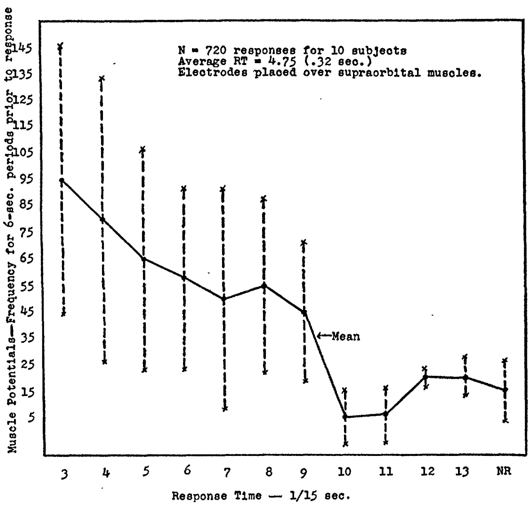

FIG. 3. Relation between response time and muscle spike activity from supraorbital electrode placement.

(muscle spikes), exhibited indications of brain activity (alpha waves). There is no doubt that muscle activity in this region of the forehead had a marked effect on the low-frequency record. On the other hand, the usual brain-wave phenomena were also exhibited along with the muscle activity. Sometimes line #2 showed great activity, with little or no activity on line #3, and line #3 showed considerable activity when line #2 was relatively inactive. It was evident that the low-frequency record gave valuable supplementary information, although the information is difficult to quantify. Furthermore, in all instances in which the subject had fallen asleep during a long, monotonous experimental session, both the high- and low-frequency records indicated a very "low-level" activity.

Line #4 in Fig. 2 indicates the effort put into the response by the subject in terms of muscle spikes per second of time from surface electrodes placed on the back of the hand over muscles involved in pressing the key. As the record shows, more effort was expended in the "startle" response to the knock on the door of the room than to the second stimulus.

It is believed that these techniques may make it possible automatically to warn personnel engaged in monotonous tasks, such as truck driving, before dangerous conditions of inalertness and approaching sleep occur.

Recovery of Western Equine Encephalomyelitis Virus From Wild Bird Mites (*Liponyssus sylviarum*) in Kern County, California[1]

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From the recently deserted nest of a yellow-headed blackbird, *Xanthocephalus xanthocephalus* (Bonaparte), in Kern County, California, approximately 1,000 mites were collected on June 21, 1946. These mites, which have been identified as *Liponyssus sylviarum* (Canestrini and Fanzago), were tested in four pools for the presence of a neurotropic virus. Each pool, containing approximately 250 mites, was ground in 3.0 cc. of 30 per cent rabbit serum-broth, centrifuged for 10 minutes at 3,000 r.p.m., and the supernatant fluid inoculated into 21-day-old mice by the combined intracerebral and intraperitoneal routes. None of the supernatant fluids contained enough bacteria to affect the animals. However, all the mice became ill or died between the third and sixth days after inoculation. Those observed while ill developed convulsions or other signs of encephalitis. Their brains were bacteriologically sterile. After three serial passages in mice were made of the agent isolated from each pool of mites, identification was undertaken. The

[1] This investigation was carried out in collaboration with the Commission on Virus and Rickettsial Diseases, Army Epidemiological Board, Preventive Medicine Division, Office of the Surgeon General, U. S. Army, aided by a grant from the National Foundation for Infantile Paralysis, Inc., and under contract with the California State Department of Public Health.

The authors are indebted to E. W. Baker, Division of Insect Identification, U. S. National Museum, for confirmation of the mite identifications; Frank Ehrenford and Ronald Reuther, who assisted in the collection of field samples; and Dorothy McAfee and Constance Morshead, who assisted in laboratory tests. Generous assistance and space for a field laboratory were supplied by the Kern County Health Department and General Hospital.

[2] Assigned to the George Williams Hooper Foundation through the California State Department of Public Health by the Communicable Disease Center, U. S. Public Health Service.

four infective agents proved to be pathogenic for guinea pigs and hamsters as well as for mice. Three of the four viruses isolated were shown to be Western equine encephalomyelitis, by challenge inoculation of Western equine immune guinea pigs and by neutralization tests in mice with specific Western equine antisera. The fourth virus shows certain antigenic peculiarities; this requires further study, the results of which will be reported at a later date.

From the nest of an English sparrow, *Passer domesticus* (Linn.), which contained two dead nestlings, a collection of 400 mites was made on June 28, 1946. This included two species which have been identified as *L. sylviarum* and *Dermanyssus americanus* Ewing. The collection was divided into two pools of approximately 200 mites each for inoculation into experimental animals. The same techniques as outlined above were used. From one of these pools Western equine encephalomyelitis virus was isolated.

Now, in addition to *D. gallinae* (*7*), at least one other genus of mites (*Liponyssus*) has been found which is naturally infected with the Western equine virus. The fact that three and possibly four isolations were made from one bird's nest incriminates as the source of infection at least one of the birds then or previously occupying the nest. Thus, evidence has been obtained regarding infection of *wild birds*, a *Liponyssus* mite, and possibly a *Dermanyssus* mite of wild birds with the Western equine virus. This evidence is similar to that reported by Sulkin (*7*) with Western equine virus and Smith, *et al.* (*6*) with St. Louis virus in the case of chickens and chicken mites. However, until persistence of infection and transmission by bite under experimental conditions is demonstrated, we prefer to reserve further interpretation of the possible role played by mites. *Culex pipiens* Linn. and *Anopheles freeborni* Aitken have been found naturally infected with Western equine virus (*4*), but their role as vectors has been discredited since experimental transmission could not be demonstrated (*2*). St. Louis virus will persist for some time in several species of anopheline mosquitoes, but transmission has not been effected (*1, 8*). In this laboratory, over a period of six years, thousands of *D. gallinae* have been tested from encephalitis areas outside of California, all with negative results (*3, 5*). In Kern County, an endemic area where surveys have been made for the past four years, *D. gallinea* have not been found in any chicken houses.[3] This suggests that it is not an essential vector or reservoir in one of the outstanding endemic areas.

These matters are emphasized not to indicate that mites are not suspected as vectors, but with the hope of preventing uncritical quotation or interpretation of mite findings.

Addendum: In 1877 Canestrini and Fanzago (*Atti Reale Inst. Veneto Sci. Let. Art.*, Ser. 5, **4**, 124–125) described *L. sylviarum* as *Dermanyssus sylviarum* n. sp. In 1884 Canestrini (*Ibid.*, Ser. 6, **2**, 1659–1660) placed the species in the new genus *Leiognathus* and used the specific name *silviarum.* The latter spelling has been commonly used by workers in acarology, whereas, according to the *International Rules of Zoological Nomenclature*, the original spelling, *sylviarum*, is correct.

L. sylviarum is known as the feather mite, or Northern fowl mite. It is commonly found on a wide range of wild bird species and is a serious pest of chickens in the northern part of the United States. In appearance this mite closely resembles *D. gallinae* (common chicken mite) but differs biologically in that it has a pronounced tendency to remain on its hosts at all times, taking blood meals repeatedly, and even laying its eggs among the feathers where they may hatch. *D. gallinae* usually leaves its host after feeding and deposits its eggs in cracks and crevices. The larval stage of *L. sylviarum* does not take a blood meal, as do the nymphal and adult stages.

Several authors have reported these two species of mites as attacking man and producing a pronounced dermatitis. This has not been our experience, although it has been a common occurrence to have hundreds of specimens crawling on laboratory personnel working with heavily infested bird nests. No bites have been noted.

[3] Unpublished data.

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Effect of 2,4-D on Bean Progeny Seedlings

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Seedlings of red kidney beans from parents sprayed with 2,4-D during the ripening of pods show a range of 2,4-D symptoms in the juvenile and mature foliage. Virus-like crisp foliage, dwarfing of growth, and serration and fusion of leaflets were noted in some degree in all seedlings. Parent plants were sprayed with 0.5 per cent and higher concentrations of 2,4-D amine salt. All seedlings showed characteristic 2,4-D injury. Unsprayed parents yielded normal seedlings.

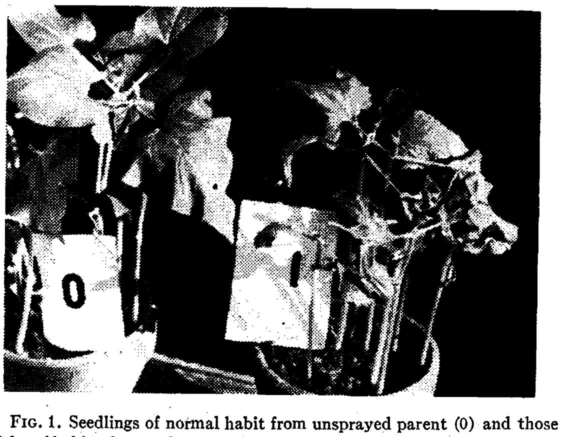

Fig. 1. Seedlings of normal habit from unsprayed parent (0) and those of dwarf habit, abnormal juvenile leaf texture, and fused mature leaf top (1) and of abnormal virus-like symptoms (1, bottom). These seedlings were from parent plant sprayed with 0.5 per cent 2,4-D.