

Fig. 1

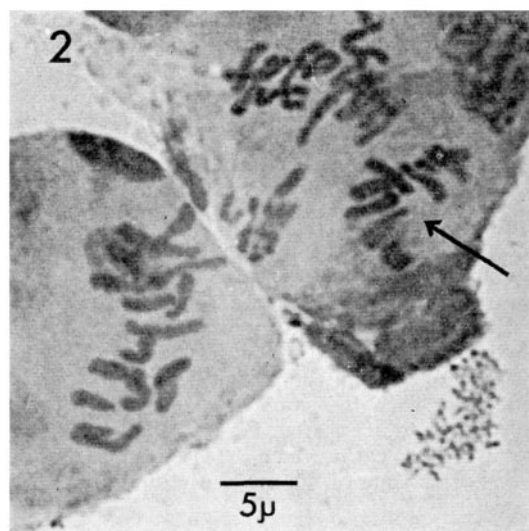


Fig. 2

Male and female individuals of *Echinorhynchus* are found in *Gammarus* of small size in the same proportions as in fully developed *Gammarus*.

The constancy of sex ratios at different degrees of crowding and in other varied environmental conditions have therefore lead us to postulate the existence of a rather rigid system of sex determination, such as is generally exhibited by animals showing sex digamety. The karyotype of *Echinorhynchus* has therefore been examined and it has been found that the males have a diploid set of seven chromosomes (Figure 1) and the females a diploid set of eight chromosomes (Figure 2). A more detailed analysis of the chromosome sets of the present *Echinorhynchus* population will be illustrated in a forthcoming paper.

A diploid chromosome set of twelve chromosomes is known in *Paramermis*<sup>5</sup> and no detectable sex chromosomes have been shown as yet in this species.

It is remarkable, therefore, that a species where sex determination appears to be largely independent of the environmental factors, which have a marked influence in *Paramermis*, shows a type of male digamety of the XO-

type which represents a rather advanced evolutionary step from the cytogenetic point of view<sup>6</sup>.

**Riassunto.** Il rapporto sessi di una popolazione di *Echinorhynchus truttiae* è risultato molto vicino ad 1:1 sia nel suo complesso che nei diversi gradi di infestazione. La femmina ha un corredo cromosomico  $2n = 8$ , il maschio  $2n = 7$  e quindi un tipo di digametia XO. Questo reperto è messo in rapporto con esempi noti di rapporti sessi variabili in altri parassiti unisessuali.

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<sup>5</sup> U. PARENTI, Rend. Acc. Naz. Lincei 32, 699 (1962).

<sup>6</sup> I thank Prof. R. DOLLFUS for the determination of the specimens.

## The Effect of Reserpine on the Achilles Reflex in Normal Young Men

NUTTALL and DOE<sup>1</sup> in 1964 reviewed the use of the Achilles reflex time as a measurement of thyroid function. McKINNEY et al.<sup>2</sup> reported its usefulness as a screening procedure in a psychiatric population. Various pathological conditions and drugs have been reported in these papers to interfere with the Achilles reflex. However, there have been no systematic studies of drug effects. The present report is a pilot attempt in this area. Reserpine was chosen as the test drug. Since it is used in hyper-

thyroidism, it seemed likely to exert an effect on reflex time.

Nine healthy young men (mean age 23) served as paid subjects. Each subject was tested on four days on five measures: (1) the one-half relaxation time of the Achilles reflex, (2) median nerve conduction time, as measured by evoked nerve potential, (3) 'eye-to-foot' reaction time on the 'Porto-Clinic' machine, which involves movement of

<sup>1</sup> F. Q. NUTTALL and R. P. DOE, Ann. int. Med. 61, 269 (1964).

<sup>2</sup> W. T. McKINNEY et al., Am. J. Psychiat. 11, 1108 (1964).

the foot from an accelerator to a brake following presentation of a visual stimulus, (4) systolic blood pressure, and (5) skin temperature. The Achilles reflex was recorded using a photomograph. The subject's foot was positioned so that its reflex motion cast a shadow on a photocell. The changing voltage in the photocell was recorded on a standard electrocardiograph machine. The one-half relaxation time was taken as the number of milliseconds from the artifact (impact of reflex hammer) to the midpoint of the relaxation phase of the inscribed uniphasic curve. All subjects were tested under control conditions (C1).

Five subjects then took reserpine, 2.5 mg orally in divided doses over a 28-h period, and four subjects took placebo according to the same program, in a double-blind design. The subjects were then tested a second time. Two weeks later they were tested again, affording a second control period (C2), and those who had taken reserpine now took placebo and vice versa. Six subjects reported marked autonomic effects when taking reserpine; no subject reported such effects while taking placebo. The reserpine regimen was thus judged to be pharmacologically effective.

The experimental results are shown in the Table. A comparison of the two control periods suggests that the measures are somewhat affected by practice, relaxation, or familiarity. 'Practice' significantly slowed the Achilles reflex and speeded 'eye-to-foot' reaction time. These changes were small and within normal limits for the measures. In a previous report McKINNEY et al.<sup>2</sup> noted the tendency for time to slow the Achilles reflex in hospitalized patients (possibly due to a decrease in anxiety).

To control for the effects of different days of the experiment, the scores on all measures were treated as 'change' scores. A post-drug or post-placebo reading was compared to its respective control score. The 'change' scores were then compared in nonparametric 't' tests to see if reserpine showed reliably different effects from placebo. The Table shows that the only statistically significant reserpine effect was to speed Achilles reflex time ( $p < 0.05$ ). Interesting but nonsignificant trends were noted in the other sets of measures. Reserpine tended to speed nerve conduction (6 of 9 subjects), decrease blood pressure (6 of 9 subjects), and speed reaction time (5 of 9 subjects).

The effect of reserpine on three measures (nerve conduction, reaction time, and blood pressure) was the same as 'practice'. However, the effect of reserpine on the

Achilles reflex was in the *opposite* direction from the effect of 'practice', suggesting the isolation of a specific drug effect. NUTTALL and DOE<sup>1</sup> reported one reserpine-treated hyperthyroid patient who maintained a fast reflex. The property of reserpine to speed reflex time is interesting in light of its use in hyperthyroidism, in which reflex time is already fast. This finding tends to corroborate the observation that in hyperthyroidism reserpine promptly combats cardiovascular signs but not neuromuscular signs. The reserpine regimen in this study may have resulted in catecholamine release without causing depletion.

JOHNSON and OLSEN<sup>3</sup> in 1960 reported a relationship between body temperature and nerve conduction time. The possibility was recognized that reserpine might exert its (nonsignificant) tendency to speed nerve conduction by increasing body temperature. Our subjects had three measurements of nerve conduction and of skin temperature under control conditions. The data were sorted by temperatures into three days, i.e. each subject's highest, medium and lowest temperature days were located. The means of the three groups of corresponding nerve conduction scores were then compared with an analysis of variance. The analysis revealed the means to be different at the 0.01 probability level in the expected direction (highest temperature days giving fastest nerve conduction scores, etc.). Intraclass correlation techniques revealed that about 46% of the total day-to-day variation in a subject's nerve conduction scores could be predicted from a knowledge of his temperatures for those days.

A relationship between temperature and nerve conduction having been corroborated, the temperature scores were then analyzed to see if they were affected by reserpine. This was done in exactly the same manner as the analysis of reaction time, ankle reflex, etc., previously described. The differences in temperatures with reserpine and placebo did not approach significance. It was therefore concluded that in the present experiment temperature and nerve conduction were related but that reserpine did not cause temperature changes which could account for its tendency to speed nerve conduction.

Using the same technique as with temperature and nerve conduction no significant relationship between the ankle reflex and temperature was found. Apparently the influence of temperature on nerve conduction was not great enough to leave its influence clearly observable in the more complex ankle reflex phenomenon.

*Zusammenfassung.* Reserpin in kleinen Dosen über eine Periode von 28 h führt zu einer Beschleunigung des Achillessehnenreflexes. Der Effekt ist statistisch gesichert, jedoch gering im Vergleich mit Veränderungen, die durch Schilddrüsenstörungen hervorgerufen werden.

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<sup>3</sup> E. W. JOHNSON and K. J. OLSEN, J. Am. med. Assoc. 172, 2030 (1960).

Effects of 'practice' and reserpine

	Ankle reflex msec	Nerve conduction m/sec	Reaction time sec/100	Systolic BP mm Hg
General means of experiment	288.8	56.5	36.3	111.2
Control period 1 (C <sub>1</sub> ) vs con- trol period 2 (C <sub>2</sub> )	Slower in C <sub>2</sub> <sup>a</sup> 11.8	Faster in C <sub>2</sub> NS <sup>b</sup> 1.2	Faster in C <sub>2</sub> <sup>a</sup> 9.7	Less in C <sub>2</sub> NS <sup>b</sup> 3.1
Reserpine vs placebo	Faster on <sup>a</sup> reserpine 11.1	Faster on NS reserpine <sup>b</sup> 1.2	Faster on NS reserpine <sup>b</sup> 3.7	Less on NS reserpine <sup>b</sup> 5.3

<sup>a</sup>  $p < 0.05$ . <sup>b</sup> NS = not statistically significant.