TABLE 1

THE RATE AT WHICH TRYPANOSOMES DISAPPEARED FROM LYMPH NODES AFTER TREATMENT WITH γ-(P-ARSENOSOPHENYL)-BUTYRIC ACID

Time of second node puncture, minutes after treatment	Number patients tested[1]	Result of second lymph node puncture	
		Positive	Negative
30	21	3[2]	18
45	15	1	14
60	2	0	2
Untreated controls, repunctured 60 minutes after the original positive puncture	16	14	2

[1] None of these are duplicates: all nodes were positive just before treatment.
[2] In two of these patients repunctured 60 minutes after treatment, no organisms could be found.

infection treated with this compound by Dr. L. Van Hoof, each of whom received a total of only 3.5 to 4.5 mg per kg, distributed over 6 to 11 injections, have now been observed for periods of 1, 5, 6 and 8 months. They are clinically well, the blood and lymph nodes remain free of organisms, and the spinal fluid remains normal. It is to be noted that one of those four patients was infected with a strain of *T. gambiense* which was unaffected even by large doses (6 gm) of tryparsamide.

(d) In the *late* cases, with clinical and laboratory evidence of central nervous system involvement, the results to date are not encouraging. A few of the patients have improved; the majority have been unaffected. There is some indication also that the drug is more toxic in late cases, in that two of these patients have died with cerebral symptoms suggestive of a toxic encephalopathy. The treatment of advanced cases is continuing, at reduced dosage (0.25 mg per kg); and it is planned to treat some cases with small doses of the γ-(p-arsenosophenyl)-butyric acid in conjunction with a pentavalent arsenical. The therapeutic efficacy of the arsenoxide alone in cases with an altered spinal fluid, but without clinical evidence of central nervous system involvement, remains to be determined.

(e) In collaboration with Brigadier G. M. Findlay, of the British Forces in West Africa, and Dr. J. Simpson, veterinarian of the Accra District, Gold Coast, a few sheep and cattle with clinical evidence of trypanosomiasis, confirmed by blood examination, and one horse with advanced symptoms have been treated. The sheep and the horse improved markedly after 2 to 3 injections at approximately 0.25 mg per kg each, and at the present writing seem well after a total of 6 to 8 injections. Organisms persist in the cattle despite some clinical improvement.

In summary, the results to date suggest that γ-(p-arsenosophenyl)-butyric acid is a highly active trypanocidal agent, with which it may be possible to cure early cases of human trypanosomiasis within two weeks or less, and with reasonable freedom from toxic reactions. This, coupled with the fact that it appears to be active against strains of trypanosomes resistant to tryparsamide and other arsenicals, may greatly simplify the mass treatment of the disease, and permit a considerable economy of time and cost. The results in late cases are not encouraging. There is some indication that the compound may be effective against some, but not all, forms of animal trypanosomiasis.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A MICROCALOMEL ELECTRODE FOR POLAROGRAPHIC MEASUREMENTS

A SATURATED calomel electrode is generally used as an external electrode in polarographic measurements. Kolthoff and Lingane[1] describe a special H-cell for use in making half-wave potential measurements. They also describe various salt bridges for use in connecting electrolysis cells to permanent external anodes. Hume and Harris[2] have discussed a special salt bridge for use in connecting an external calomel electrode with the solution being studied in the electrolysis cell.

We have designed a microcalomel electrode (Figs. 1 and 2) to be used internally with the dropping mercury electrode. An obvious advantage of using the micro electrode is that it is independent of the electrolysis vessel which can therefore be cleaned and refilled with fresh samples without disturbing the electrode itself. When desired, the calomel electrode and its salt bridge container can be removed and stored in saturated potassium chloride solution.

The electrical resistance of a cell composed of a microcalomel electrode and a hydrogen electrode dipping into a saturated solution of potassium chloride was found by standard methods[3] to be 1,500 ohms. The same resistance was found for the cell irrespec-

[1] I. M. Kolthoff and J. J. Lingane, "Polarography," Interscience Publishers, Inc., New York, N. Y., 1941.
[2] D. N. Hume and W. E. Harris, *Ind. Eng. Chem., Anal. Ed.*, 15: 465, 1943.
[3] S. G. Starling, "Electricity and Magnetism," sixth edition, Longmans, Green and Company, New York, N. Y., 1937.

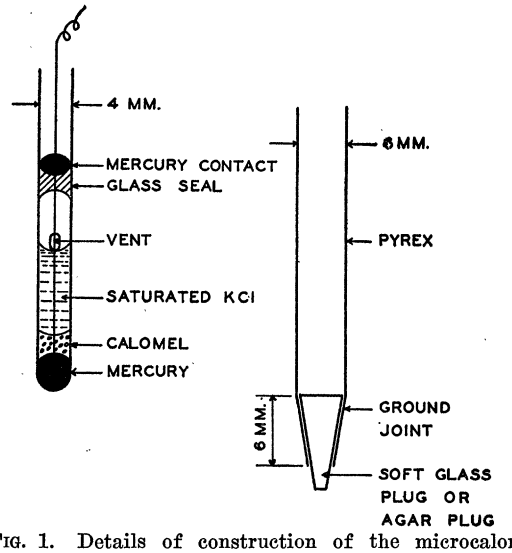

FIG. 1. Details of construction of the microcalomel electrode.

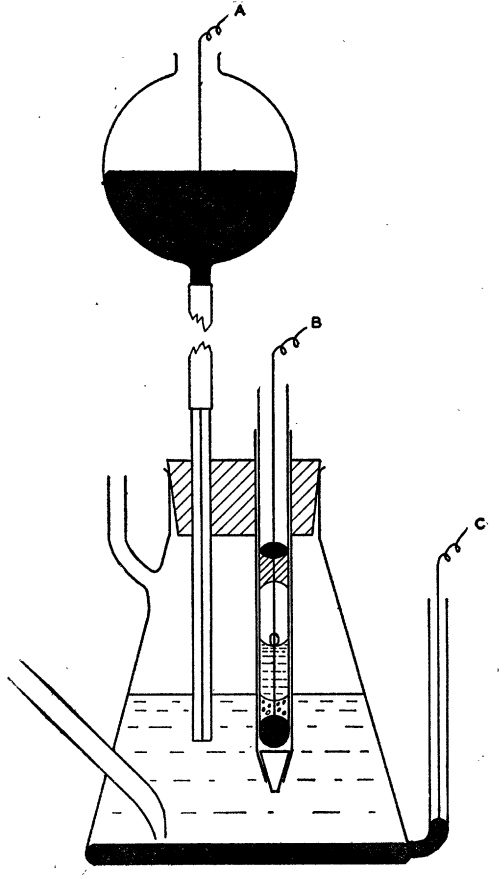

FIG. 2. Assembled electrode and cell. The half-wave potential is most readily measured by determining the potential difference between A and B at the half wave.

tive of whether a glass or agar plug was used in the microcalomel electrode.

Since the value of the internal resistance of the entire cell was only 1,500 ohms, the resistance of the microcalomel electrode and bridge alone must be less than this value. This compares favorably with the reported "several hundred ohm" resistance of the H-cell of Kolthoff and Lingane, and the 600 ohm resistance claimed for the bridge alone in the case of Hume and Harris. It is to be noted that where ground glass plugs are used, the contact surface of the plug should not exceed the length given in Fig. 1, since the resistance of the electrode will increase rapidly with the length of this surface. Where potassium chloride is detrimental to the electrolysis it is recommended that agar plugs made up to contain ions common to the supporting electrolyte be used.

In Table 1 we list half-wave potentials of various ions as measured against our electrode and the corresponding half-wave potentials recorded in various standard references. This table shows that the micro electrode gives values comparable with the values recorded in the literature.

TABLE 1

COMPARISON OF DETERMINED HALF-WAVE POTENTIALS WITH THOSE RECORDED IN LITERATURE

Ion	Supporting electrolyte	Recorded half-wave potential (V.S. Sat. calomel electrode)				Our value
		Kolthoff Lingane	Sargent (Brochure)	Majer (Chart)	Average	
Tl+	0.1N.KCl	−0.460	−0.467	−0.45	−0.459	−0.460
Cd++	0.1N.KCl	−0.599	−0.647	−0.59	−0.612	−0.605
Co++	0.1N.KCl	−1.20	−1.20	−1.22	−1.21	−1.24
Zn++	0.1N.KCl	−0.995	−1.03	−1.03	−1.02	−1.00
Ni++	1.0N.KCl	−1.10	−1.06	−1.05	−1.07	−1.15

Note: The values attributed to Majer were estimated from his chart on the Polarographic "Spectrum" of the elements. The exact conditons of electrolysis are not known in the case of the values given in his chart.

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