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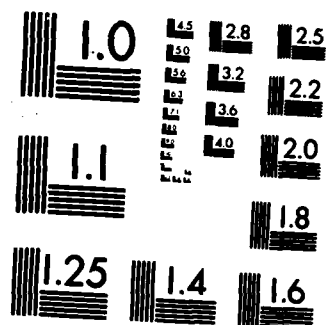
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A computer-assisted light microscope (Leitz MPV-DADS) was purchased with funds provided by this DoD Instrumentation Grant. The system is capable of photometric image scanning of autoradiographic material and very low-power dark field and fluorescent photomicroscopy. These capabilities are essential for neuroanatomical research being conducted in two laboratories at this institution.

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Final Technical Report

July 1, 1986

Air Force Office of Scientific Research

AFOSR 85-0079 (Adaptive Networks)

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Computer Assisted Microscope for Adaptive Network Research

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AIR FORCE OFFICE OF SCIENTIFIC RESEARCH (AFOSR)

NOTICE OF TRANSMITTAL TO DTIC

This technical report has been reviewed and is approved for public release IAW AFR 190-12.

Distribution unlimited.

WILLIAM J. VITELL

Chief, Technical Information Division

I Summary

A computer-assisted light microscope (Leitz MPV-DADS) was purchased with funds provided by this DoD Instrumentation Grant. The system is capable of photometric image scanning of autoradiographic material and very low-power dark field and fluorescent photomicroscopy. These capabilities are essential for neuroanatomical research being conducted in two laboratories at this institution.

II Research Objectives and Specific Studies by PI

The primary objective of the research associated with this instrumentation was to carry out neuroanatomical studies relevant to projects associated with biological investigations of adaptive systems, specifically the neuronal control of conditioned responding (Re: AFOSR 83-0215). These studies addressed the interconnectivity of brain structures essential for the classically conditioned nictitating membrane response (NM CR), especially the anatomical relationships among the accessory abducen nucleus (AAN), the principal source of motor

control of the NM CR, and magnocellular red nucleus (RN), an essential premotor link in the circuit. We used implanted WGA-HRP for fiber tracing studies designed to verify our previously reported findings with HRP that RN projects to AAN. We were also concerned about brain stem projections to AAN from the dorsolateral pons and cerebellum. This research is in its final stages: a report earmarked for publication is being prepared at this time, and an abstract for presentation of our findings at the next Society for Neurosciences meeting has been submitted: Rosenfield, M.E. & Moore, J.W. HRP-WGA Studies of Pre-motor Cerebellar-Brain Stem Pathways for the Classically Conditioned Nictitating Membrane Resonse. Basically, our findings with WGA-HRP are entirely consistent with our previously published results based on HRP.

During the past 12 months we initiated another WGA-HRP study designed specifically to detect the existence in rabbit of an ipsilateral descending limb of brachium conjunctivum (BC) terminating in the dorsolateral pons. As a possible premotor component of the NM CR, such an anatomical entity might account for CR-related single neuron activity observed in the dorsolateral pons and reported by Desmond and Moore. Despite reports of such a descending limb of BC in rat and monkey based on autoradiographic methods, we have thus far been unable to detect a homologous projection system in rabbit. These results will also be presented this fall at the Society for Neuroscience meetings.

We have not yet decided on a suitable venues for publication. The study focusing premarily on the relationship between RN and AAN would be perhaps best suited for Brain Research Bulletin because this is where our initial study on this subject appeared. That journal was selected because of its superior reproduction of anatomical material and

emphasis on behavioral neuroscience. The study on the descending limb of BC, however, will probably be submitted to Experimental Brain Research because this journal has become a highly visible outlet for quality work on rabbit NM conditioning, and it is the journal in which some of the evidence for a descending limb of BC has been published.

III Technical Reports (Publications)

None as yet because the instrumentation package was not complete and functioning to meet our requirements until recently. In short, the time required to purchase, debug, modify, and learn to use the system took approximately 18 months.

IV Professional Personnel

John W. Moore, Ph.D., Professor of Psychology (Neuroscience Behavior) and Associated Professor of Computer and Information Sciences.

V Interactions

Our primary interactions surrounding this instrumentation have been with Dr. Kay Fite who conducts neurobiological studies of vertebrate vision.

Research conducted by Dr. Fite and her colleagues in which this instrumentations has been used will be presented at the next Society for Neuroscience meetings (Fite, K.V., Taggart, G., Bengston, L., & Montgomery, N.N. 3(H)2-Deoxyglucose Analysis of the Neural Substrates of Horizontal Optokinetic Nystagmus in Rana Pipien.)

VI New Discoveries

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The primary "new discovery" is our failure to find anatomical evidence for an ipsilateral descending limb of BC.

VII Additional Information

My colleagues Dr. D.N. Spinelli and Dr. P. Herron were indicated as potential users of this instrumentation. Dr. Spinelli has not yet made use of the device, and Dr. Herron has left this institution. However, he will be replaced by a neuroanatomist who will no doubt make use of the instrument.

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