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An electron microscopical study of the mitochondrial fraction of the rat brain cortex

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Biologia. — *An electron microscopical study of the mitochondrial fraction of the rat brain cortex* (*). Nota di CARLOS MUNOZ–ASTETE (**), presentata (***) dal Socio A. STEFANELLI.

RIASSUNTO. — Abbiamo analizzato con il microscopio eletronico, una frazione mitocondriale di un omogeneizzato di corteccia cerebrale di topo (P 2), messa in un gradiente lineare di Ficoll dal 2% al 18%. La soluzione di Ficoll è stata fatta con saccarosio 0,32 M.

La frazione mitocondriale è stata frammentata in tre sotto–frazioni: F_1, F_2 e F_3; la prima F_1, è stata a sua volta suddivisa in F_1 I e F_1 II.

Il microscopio elettronico ha rivelato la presenza, in entrambe le sotto–frazioni F_1 I e F_1 II, di una grande quantità di componenti sinaptici, formati da sinaptosomi, terminali nervosi e anche mitocondri liberi.

Nelle sotto–frazioni F_2 e F_3, si sono trovate delle sottili mieline isolate o racchiudenti grandi vesciche.

MATERIAL AND METHODS

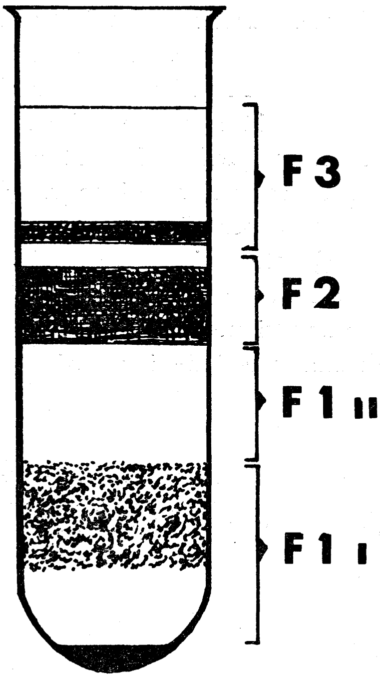
The mitochondrial fraction of a homogenized brain cortex of a rat was put in a linear Ficoll's gradient between 2 % and 18 %; the solutions were made with saccharose 0,32 M.

By means of electron microscopy three sub-fractions were analyzed, the first one (F_1) was subdivided in two: F_1 I and F_1 II (Scheme A).

Preparations of fractions for electron microscopy.

The sub-fractions were fixed in a solution of 2 % osmium tetroxide buffered with veronal pH 7,2, embedded in Epon 812, and sectioned on a LKB ultramicrotone. The sections obtained were stained for a better contrast with lead citrate.

The stained sections were studied and photographed in an electron microscope Hitachi U 11.



Scheme A

(*) Lavoro eseguito nell'Istituto di Anatomia Comparata G. B. Grassi dell'Università di Roma.

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(***) Nella seduta dell'8 aprile 1972.

RESULTS

The fraction F_1 I is very rich in nerve endings and other synaptic components (Pl. I).

The nerve endings are of very different sizes and contain a large quantity of typical synaptic vesicles. Synaptosomes are also present, though they do not have membranes and post-synaptic components (Pl. I).

The existing mitochondrias are in a free form, at the same time it is possible to notice the presence of some vesicles of unknown origin.

The fraction F_1 II has a great similarity with the previous one, showing tiny, stretched, dark corpuses (Pl. II), that are surely fractions of nerve endings.

It is possible to observe synaptosomes with presynaptic vesicles and mitochondrias (Pl. II).

The mitochondrias are in a very good state of conservation and are found in a free form.

In the fractions F_2 and F_3 we found very thin fragments of myelin with their characteristic lamination (Pl. III and Pl. IV) enclosing, in some cases, axons in the interior of which vesicles of different sizes can be found.

We did not notice the presence of well defined organoids.

Sub-fraction F_1 I	Sub-fraction F_1 II	Sub-fraction F_2	Sub-fraction F_3
Nerve endings	Dark corpuses (pieces of nerve endings)	Fragments of myelin	Fragments of myelin
Synaptosomes	Synaptosomes		
Free mitochondrias	Free mitochondrias		
Undefined vesicles	Undefined vesicles		

The present Note corresponds to the morphologic representation of the different sub-fractions of the mitochondrial fraction F_2, which must necessarily be completed by a biochemical study which is being prepared by Prof. Fernando Orrego and co-workers in the Physiology Department of the Faculty of Medicin, University of Chile.

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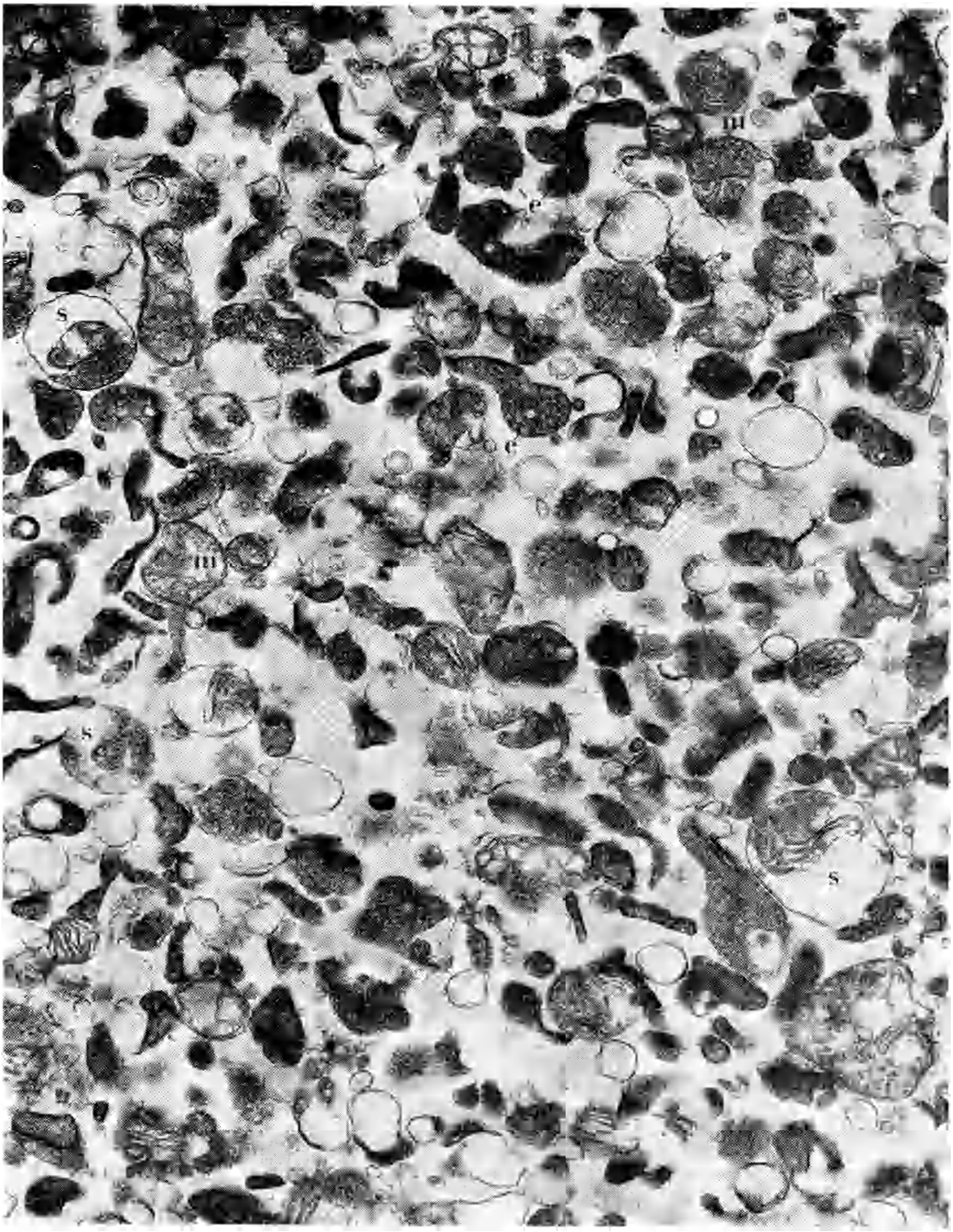
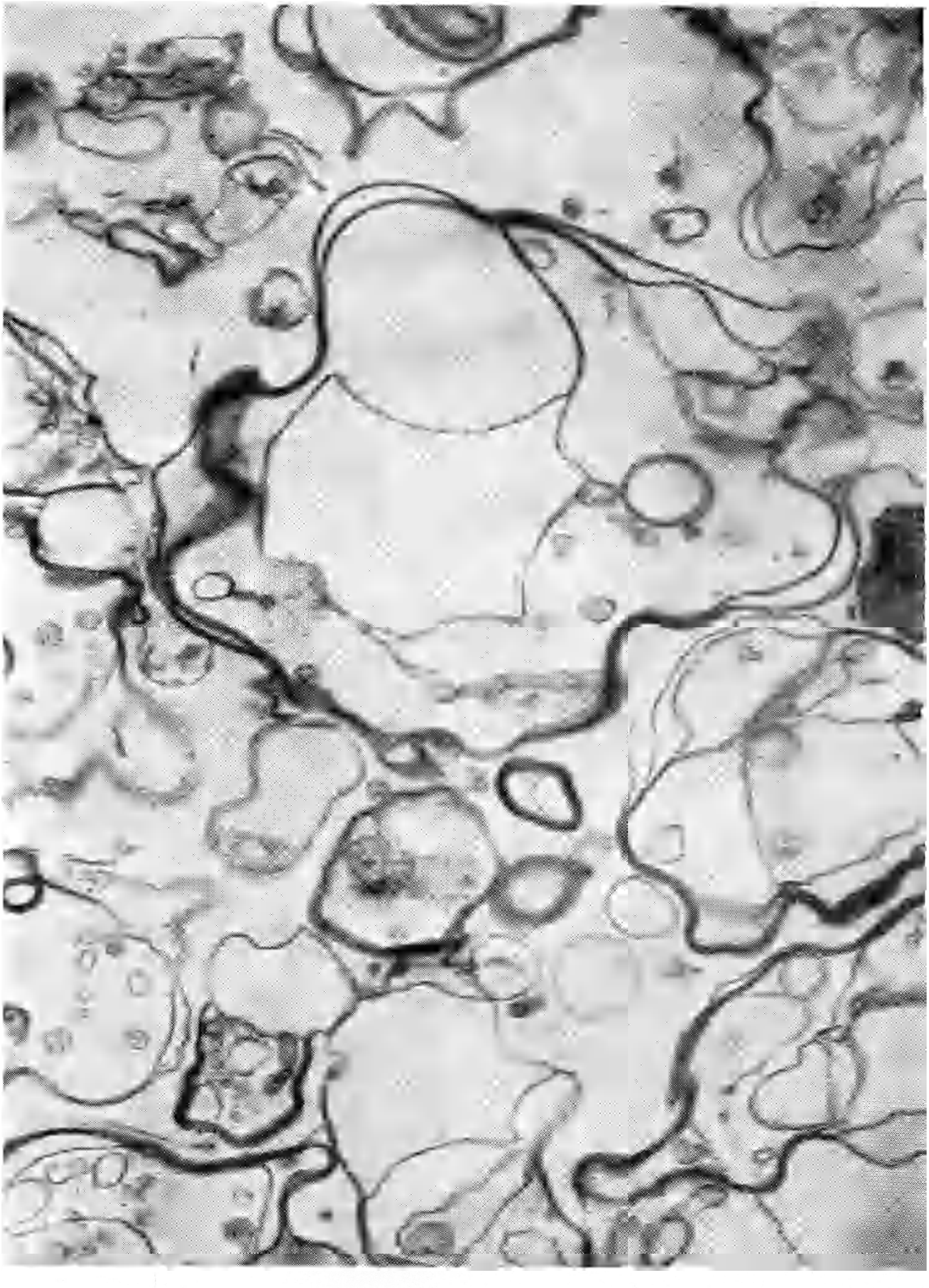
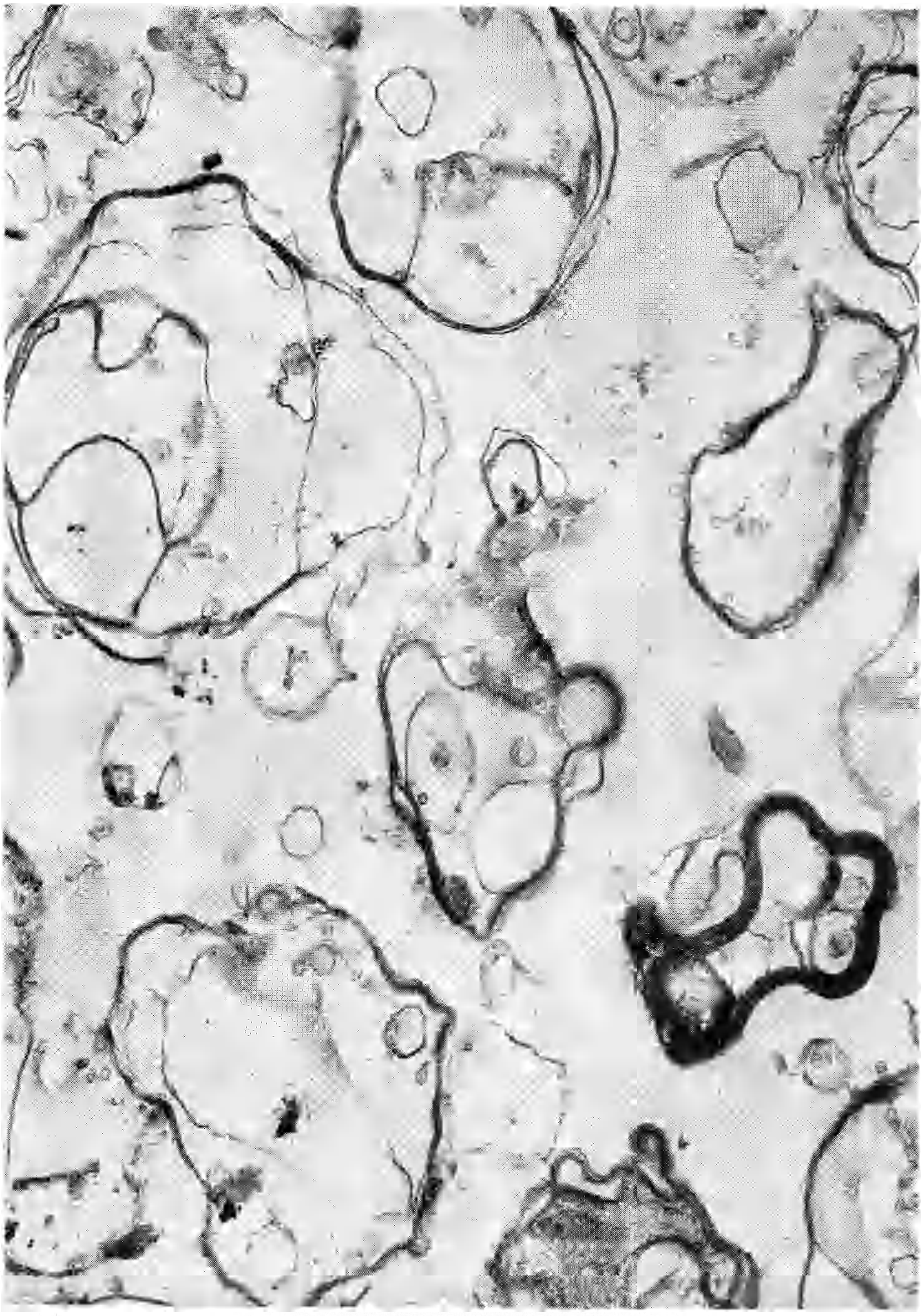
Electron photograph of the sub–fraction F_1 I showing various mitochondrias (*m*), nerve endings (*e*), synaptosomes (*s*). ×43.100.



Electron photograph of the sub–fraction F1 II showing various free mitochondrias (*m*), fractions of nerve endings (synaptic fragments) (*e*). ×43.100.



Electron photograph of the sub-fraction F_2 showing thin fragments of myelin. ×43.100.



Electron photograph of the sub–fraction F_2 showing fragments of myelin of very low thickness. ×43.100.