quantitative, dont les résultats sont donnés dans le Tableau, a pu être réalisée chez deux d'entre eux.

Etude quantitative du nombre de colibacilles naturels et de colibacilles d'implantation (*E. coli* « L») décelables dans 1 g de matières fécales après ingestion d'une souche étrangère de microorganismes (*E. coli* « L»).

	Heures après ingestion de *E. coli* « L»	Nombre de *E. coli* par g de fèces	
		E. coli naturels	*E. coli* « L»
Sujet A	0	$2{,}0 \cdot 10^8$	–
Ingestion $6 \cdot 10^9$	24	$6{,}0 \cdot 10^7$	$2{,}0 \cdot 10^7$
E. coli « L»	48	$1{,}7 \cdot 10^6$	$2{,}2 \cdot 10^7$
	70	$3{,}2 \cdot 10^6$	$2{,}0 \cdot 10^6$
Sujet B	0	$2{,}3 \cdot 10^8$	–
Ingestion $1 \cdot 10^9$	18	$2{,}3 \cdot 10^8$	$1{,}4 \cdot 10^8$
E. coli « L»	22	$1{,}9 \cdot 10^8$	$1{,}5 \cdot 10^8$
	48	$2{,}2 \cdot 10^8$	$2{,}0 \cdot 10^8$

Les résultats obtenus montrent qu'un mutant d'*Escherichia coli*, présentant divers caractères qui permettent son identification biochimique et résistant à la streptomycine, apparaît dans les selles après avoir été ingéré. Des recherches sont actuellement en cours pour déterminer pendant combien de temps il peut persister dans le tube digestif. D'autres souches de colibacilles, identifiables grâce à certaines propriétés particulières, sont également à l'étude.

Y. Posternak, R. Regamey, P. Rentchnick et G. Bickel

Clinique médicale universitaire et Laboratoire central de l'Hôpital cantonal de Genève, le 21 mai 1957.

Zusammenfassung

Die beschriebene Methode gestattet, das Überleben zu therapeutischen Zwecken oral eingeführter Stämme von *Escherichia coli* in der Darmflora weiter zu verfolgen.

PRO LABORATORIO

A Densitometric Adapter for Direct Plotting of Electrophoretic Curve from Paper Strips

Up to the present time there is perhaps no biochemical method of determination which, in such a short time, has spread so widely in clinical medicine as the paper electrophoresis of proteins[1].

In most cases the clinician must be satisfied with only the evaluation of the electrophoretic strip by estimation firstly because the quantitative measurement of single protein fractions by evaluation is very laborious and the special densitometric apparatuses required are expensive. Finally it is not possible nowadays to imagine a scientific publication in this branch without a documentation with an electrophoretogram[2].

In view of this situation, I developed the idea of constructing a simple adapter which would permit a densitometric evaluation of electrophoretic strip in a spectrophotometer. After nearly two years of different experiments and constructive improvements, I succeeded in constructing an adapter (Mod. IV) which is no longer an emergency solution but a perfect apparatus in which it is possible to register directly the electrophoretic curve[3].

Construction and principle. This adapter was constructed for the operation with the Coleman-Junior Spectrophotometer. The adapter consists of two parts: a densitometric and a registrating one. Both parts can be separated or connected firmly together by means of the screw *S*. The Adapter is made of metal (dural, brass, steel).

During the operation, the densitometric part is plunged into the cuvette well of the spectrophotometer; it has the outside dimensions of the original cuvette adapter. Its function is very clearly apparent on the schematic diagram (Fig. 1). The coloured and transparent electrophoretic strip moves horizontally in front of the photocell by winding from the axis *B* onto the axis *A* (leading axis). On the upper end of the axis *A*, a wheel (diameter 34 mm) is fixed. By turning this wheel we are able to shift simultaneously both the electrophoretic and registrating strips. Two opposite slits of 2·5 mm width and 32 mm length are cut out in the cylindrical mantle, which can be put on the lower end of this part of the Adapter.

The registrating part is simply a flat box (dimensions: 70 × 50 × 14 mm) with the upper lid on hinges (Fig. 2). Through this lid a horizontal slit of 3 mm width and 60 mm length is cut out. On the upper margin of this slit, a millimeter scale is engraved so that the figures rise from 0 on the right to 60 on the left. At the left lower corner of this registrating box, a simple device is arranged by means of which the inserted Adapter can be very firmly and reliably fastened to the galvanometer lever housing of the spectrophotometer (Fig. 2).

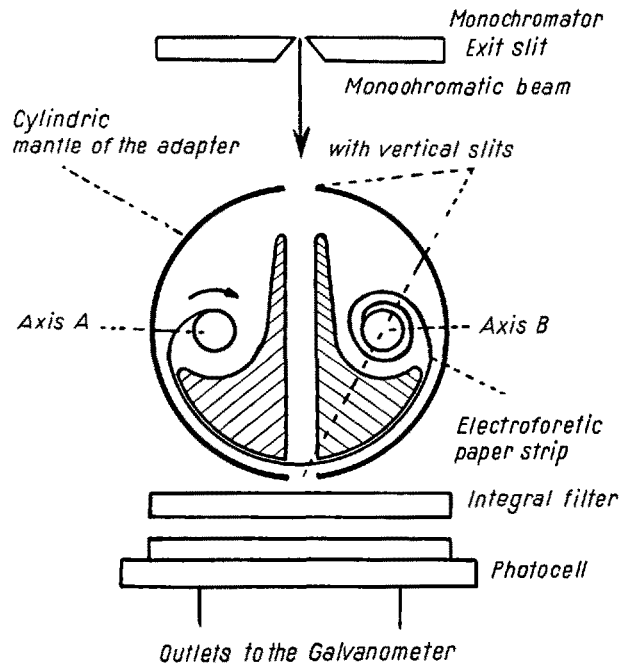


Fig. 1. – Schematic diagram of densitometric adapter.

The registering paper strip is 63 mm wide and 180 mm long with the left margin cut aslant in order to be insert-

[1] A. Dittmar, Papier-Elektrophorese (Gustav Fischer-Verlag, Jena 1956). – F. Wuhrmann and Ch. Wunderly, *Die Bluteiweisskörper des Menschen* (Benno Schwabe & Co., Basel 1952).

[2] M. D. Schulz *et al.*, Amer. J. clin. Path. *24*, 1110 (1954).

[3] Ch. Eger, Exper. *12*, 37 (1956). – G. Ceriotti, Exper. *13*, 44 (1957). – I became aquainted with this work when I had already overhanded my paper to the publishing board of Experientia.

ed into the fissure of the horizontal axis. The registering paper must be exactly as thick as the electrophoretic paper to assure the simultaneous shifting of both the strips. (I simply use the same paper, Whatman I.) Vertical ordinates 2·5 mm distant are preprinted on this paper.

Fig. 2. – The adapter inserted in the Spectrophotometer. Ready for the operation.

On the right side, below the horizontal (registering) slit, at a distance of 2 mm, there is a short parallel slit (2 × 5 mm), and the same kind of slit occurs near the upper end of the vertical (densitometric) slit. By means of these additional slits, we can test whether the shifting of both strips was really simultaneous during the measuring process.

Procedure. – A registering paper is put into the upper part of the Adapter and the coloured electrophoretic strip (35 mm wide, 180 mm long, with both ends cut aslant) made transparent by a clarifier (paraffin oil, silikon oil, brom-naphtaline) into the densitometric part. The starting marks in both additional slits are made with a red pencil. Both parts are connected, the Adapter plunged into the cuvette well and fastened with the screw (Fig. 2).

The standard scale panel is changed for the special one which I have made by a photographic process. By means of it we can read directly the values of the protein concentrations and plot them in the millimeter scale from 0 to 60. (Up to the present time, I have made the evaluations at the wavelength of 620 mμ, I am now using 580 mμ. We dye the strips with Brom-Phenol-Blue.)

First we set the galvanometer index to 100% Transmittance (0 of the Optical Density) when the beam passes through the clear paper before the albumin. Then we shift both strips so that the shifting is always 2·5 mm which we check on the ordinates in the horizontal registering slit. We read the respective deviation of the galvanometer index, and plot them directly on the ordinate which lies close under the scale of the registering slit. In the normal electrophoresis, it is necessary to make about 40 or 50 such plottings. This takes about 10 min. With that the operation is finished. We take out the Adapter from the apparatus, make again the red marks in the testing slits, disconnect the parts and take out both the strips.

We join the registered points on the recording strip and thus obtain the resulting electrophoretic graph. We place the electrophoretic strip and the graph so gained above each other, and we can at once check whether we have worked correctly, provided, of course, that both the strips were shifted really simultaneously. In this case the starting and the ending red marks must fall on each other (Fig. 3).

Sometimes it happens that the boundary of singular protein fractions is not quite straight, on the contrary it may be accurate. If we were not able to repeat the electrophoresis, we can make the densitography with

Electrophoretogram recorded with Densiometric adapter *sec.* PALACKÝ on Coleman-Junior Spectrophotometer.

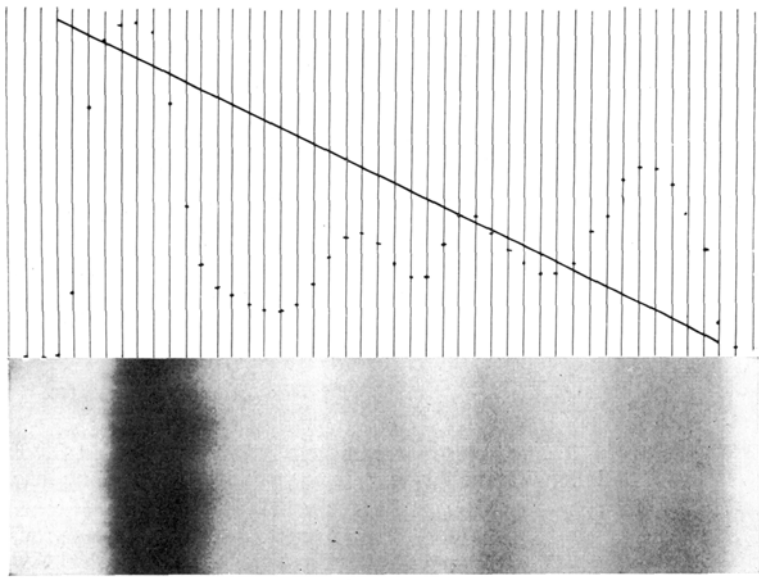


Fig. 3. – On purpose we didn't join the plotted points with a line. Note the starting and the end marks which lie precisely above each other proving that the shifting of both the strips was really simultaneous. The aslant (green) line on the registering paper helps us to get information about the proceeding of the operation. In the recording slit namely this oblique line runs from the left to the right. When, for instance, it is under the figure 30 we recognize that a half of the graph is over.

a slit of half-length (16 mm) by which we commit a lesser mistake than with the slit of full length. For this purpose, the 16 mm slits are cut in the cylindrical mantle rectangularly with the normal slits.

In successful electrophoretic strips with a perfect partition of protein bands, we can of course obtain still more exact values, when using a very narrow densitometric slit *e.g.* 1 mm. In this case it would be an advantage to concentrate the rays on the narrow slit in putting a cylindric lens (a glass round rod of 2·5 mm diameter) close in front of the strip.

The work with this densitometric Adapter Model IV is very quick and exact. It has the great advantage that we can directly obtain the electrophoretic graph. Even a non-qualified worker is able easily to learn the manipulation of it. The only disadvantage is that the device cannot be improvised but must be made very precisely. It is equal to the special and expensive densitometric apparatuses.

Acknowledgement. I am much obliged to render thanks to Mr. A. Šmíd for a very perfect technical construction of the models of my Adapter and for a very devoted and initiative technical collaboration by the merit of which my work, after numerous experiments, has been led to a successful end.

I am also much obliged to render thanks to Dr. J. Bártek, Doctor-in-Chief of Central Laboratory of our Hospital for a friendly collaboration and precious advices.

A. Palacky

Pediatric Department of the County Hospital at Uh. Hradiste, Czechoslovakia, December 28, 1956.

Zusammenfassung

Der Verfasser beschreibt eine Apparatur zur objektiven Auswertung der Papierelektrophoretogramme. Er benützt ein Coleman-Spektrophotometer und einen besonders entwickelten Adapter.

Informations - Informationen - Informazioni - Notes

STUDIORUM PROGRESSUS

Regulation of Blood Pressure and Hypertension

By C. Heymans*

Experiments performed in different laboratories[1] have shown that blood pressure is regulated reflexly by the action of arterial pressure itself on receptors sensitive to pressure located into the walls of the blood vessels of the aortic arch and carotid sinus areas.

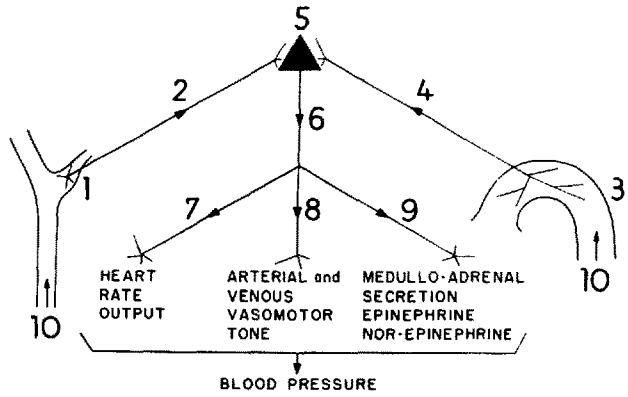
These presso- or baro-receptors are connected by means of the aortic and carotic sinus nerves with the nerve centres regulating and maintaining arterial blood pressure at normal levels. Any deviation of arterial pressure induces, by means of the aortic and carotid sinus baroreceptors, compensatory reflexes and adjustments so as to restore arterial blood pressure at its normal levels. The efferent pathways of this self-adjustment of blood pressure, of this physiological blood pressure homeostasis, are the vagus and sympathetic nerves adjusting heart rate and cardiac output, the sympathetic vasomotor nerves adjusting the peripheral vasomotor tone of small arteries and veins, and thus the peripheral vascular resistance and the circulating blood volume, and the sympathetic nerves regulating the epinephrine and norepinephrine secretion of the suprarenal glands. These hormones also act, but by an humoral way, on heart rate, cardiac output and peripheral vascular resistance (Figure).

Further experimental observations showed that the aortic and carotid sinus baroreceptors and their nerves are not only the fundamental means of the blood pressure homeostasis, but also are the reflex buffer or moderator mechanisms of the systemic arterial pressure.

* Department of Pharmacology, Medical School University of Ghent (Belgium).

[1] H. E. Hering, *Die Karotissinusreflexe auf Herz und Gefässe* (Verlag Steinkopf, Dresden/Leipzig 1927). – Eb. Koch, *Die Selbststeuerung des Kreislaufes* (Verlag Steinkopf, Dresden/Leipzig 1931). – C. Heymans, *Le Sinus carotidien* (Presses Universitaires, Paris 1929). – C. Heymans, J. J. Bouckaert, and P. Regniers, *Le Sinus Carotidien et la zone homologue cardio-aortique* (Doin et Cie, Paris 1933).

Paralysis of the baroreceptors or section of the aortic and carotid sinus nerves induces, indeed, a marked rise of blood pressure, thus a condition of acute or chronic arterial hypertension.



Schema of Self-regulation of Blood Pressure. *1* Carotid sinus baroreceptors; *2* Carotid sinus nerves; *3* Aortic baroreceptors; *4* Aortic-depressor nerves; *5* Cardio-vascular centres; *6* Efferent pathways of self-regulation of blood pressure; *7* Vago-sympathetic nerves to heart; *8* Vasomotor nerves to arteries and veins; *9* Sympathetic nerves to medullo-adrenal glands; *10* Arterial pressure acting on baroreceptors.

Everybody would agree that hypertension is a deviation of the arterial pressure, a 'resetting' of arterial pressure from normal to higher levels. In order to evaluate the origin and mechanism of this 'resetting' of blood pressure in hypertension, we ought to know in full details the physiological mechanisms maintaining blood pressure at normal levels. The physiology of blood pressure regulation is, thus, fundamental for the evaluation of the pathogenesis of hypertension.

As arterial pressure is maintained or restored reflexly at normal levels by the action of blood pressure itself on the aortic and carotid sinus baroreceptors, the question arises: how does arterial pressure act on these baroreceptors?

It has long been accepted that arterial pressure and its deviations act directly on the aortic and carotid sinus receptors. It has been stated, furthermore, that arterial pressure acts on the baroreceptors, by deforming and