

A Paul – de Saussure Electroscope at Lausanne University

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Introduction

In 2007, I was granted permission to search the cavernous attic of the 16th century building (Fig. 1) that was formerly the seat of the Academy of Lausanne (University since 1890), now used as a storeroom by the 'Gymnase (i.e. High School) de la Cité'. Both the Academy and the Gymnase were located there until about 1890, when University physics moved to a modern building not far away. Old, obsolete equipment was probably not transferred to the new building.

Electroscope

At the bottom of a large cardboard box filled with rather uninteresting 20th-century electrical instruments, I had the good luck to find a small object (Fig. 2) signed 'Paul à Genève' (Fig. 3), intact and in working condition.

A comparison with the electroscopes described by Archinard and Hackmann^{1, 2, 3, 4} shows it to be a pith balls electroscope of the type made by Paul in 1785 for H.-B. de Saussure, who used it to study atmospheric electricity, notably when ascending Mont-Blanc in 1787. It has the characteristic four pairs of metallic earthing strips, internal and external, but, as seen in Fig. 4, no internal scale to read the angle between the balls.

The first regular experimental physics lectures at the Academy of Lausanne, with the required collection of physics instruments ('Cabinet de physique'), began in 1776. Early inventories⁵, dated 1822 and 1872, mention an 'Electroscope de Saussure' as being part of the collection of physics instruments of the Academy, with a list of now lost accessories (metal hood, rod, etc.). It is more than tempting to assume that we found the original de Saussure electroscope listed there.

This electroscope, one of the oldest objects in our collection of ancient physics instruments, is now prominently displayed in the Physics Museum at UNIL/EPFL, inaugurated in January 2009 (Web site: <http://musee-physique.epfl.ch>).

About the Maker

The known facts about the life and family of Jaques Paul (1733-1796) are summarised below, such as given by Senebier⁶, Heyer⁷ and Schulé⁸.

Jaques (or Jacques) Paul was born in Geneva in 1733. At the end of the 17th century, his grandfather had left south-eastern



Fig. 1 'Château et Cathédrale' at the beginning of the 20th century. The Academy building is the long-roofed one, in front of the bell-tower of the cathedral.

France, fleeing from the religious persecutions, and had taken refuge in Calvinist Geneva. Both his grandfather and his father were pewterers, established in Geneva but not citizens.

Jaques was a precocious child, becoming Master pewterer at the early age of 14. A few years later, not yet 20, he devised and built a machine needed to lift and position precisely the enormous blocks of stone used in the construction of the new western portico of the Saint-Pierre cathedral. He had soon other opportunities to show his inventiveness, building a sewer for a prominent citizen of Geneva. At the age of 22, he left for Paris, where he had soon to abandon the intended apprenticeship as a cannon-, bell- and statue-founder, too expensive for his limited means. He then worked for the renowned scientific instrument maker Jacques Canivet. He also found time to attend the lectures by Abbé Nollet.

In 1757, called back to Geneva by his sick father, he worked for clockmakers, perfecting pieces of apparatus needed by them, and also for scientists such as Horace-Bénédict de Saussure and Jean-André de Luc: for him, he built in 1763 a portable mercury barometer^{1, 2}, of the type later used by de Saussure when ascending Mont-Blanc.

From his marriage in 1759, he got two sons and a daughter.

After a long period of peace and prosperity, Geneva once more experienced, from about 1762 on, a lengthy period of civil and political unrest. Many Geneva inhabit-

ants, even if born there, were discriminated against for not being citizens: they had somewhat limited civil rights and no political rights at all. Jaques and his family left in 1763 for Montbéliard (now in France, near Basel, but then a Lutheran town, dependent upon the duchy of Württemberg). In the mechanical workshop he opened there, he produced specialised parts for repeating watches ('cadratures').

Back to Geneva in 1776, he was admitted to citizenship ('Bourgeoisie'), free of charge, without having to pay the sometimes very high admission fees, in recognition of his exceptional talent, and its usefulness for the prosperity of the city. For the Govern-



Figs. 2 Paul – de Saussure electroscope. Base diam. 70 mm; height 70 mm.



Fig. 3 Maker's signature on the bottom.

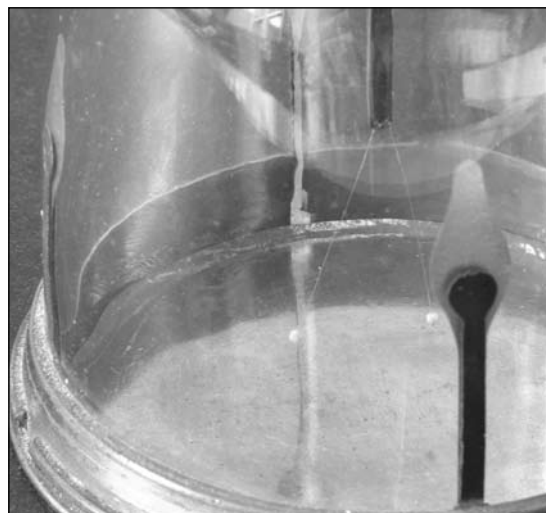


Fig. 4 Close-up of the pith balls suspended by thin metal wires.

ment of the Republic, he produced weight standards and precision scales. For and in collaboration with scientists such as Marc-Auguste Pictet and H.-B. de Saussure, he executed the instruments they had imagined. One of the best known is the hair hygrometer⁹, devised by de Saussure, of which Paul made and sold at least 150, all over Europe. For him, he also made electroscopes, magnetometers, anemometers, etc.^{1,2} Also interested in public affairs, he became in 1787 the first editor of a weekly newspaper, the *Journal de Genève*, the last number of which was printed in 1794. In 1788, he was appointed Manager of the Waterworks, supervising the hydraulic machine supplying Geneva with water pumped from the Rhone river, and living in a house next to it. The same year, his second son, Nicolas, aged 25, became a partner in the direction of the mechanical workshop. Jaques Paul was consulted as an expert on all kinds of technical matters. For instance, he acted as an adviser when, in 1791, a new model of ladder for the fire brigade was chosen. He even built a prosthetic arm.

In not too good health since 1788, he died in December 1796, aged 63.

The first of his sons, Théodore-Marc (1760-1832), is specially known for having been the first 'Sautier' of Geneva to record, in 1818, the date of appearance of the first leaf on a given horse-chestnut tree near the Town Hall ('Hôtel de Ville', seat of the Government), of which he was the Warden and where he lived. This series of uninterrupted annual records gives an indirect information about temperatures and climate. Besides, he is reputed to have built a maximum/minimum hair hygrometer, now lost, and of which no description is left.

Nothing is known about the studies of the second son, Nicolas (1763-1806), except

the fact that he travelled for several years, staying in Paris and in England. Back in Geneva, he worked in close collaboration with his father from 1788. The instruments made in the workshop are signed "Paul", without first-name initial. He was also busy perfecting balances, controlling the weights and measures in use in the Republic and trying to keep in working condition the ageing hydraulic machine supplying Geneva with water, officially succeeding his father as supervisor of the waterworks in 1796. In 1790, Nicolas Paul and his father Jaques, the pharmacist Henri-Albert Gosse and Jean-Jacob Schweppe formed a partnership to produce and sell artificially carbonated water¹⁰. Nicolas, married in 1792, got a technically gifted son, Jean-Théodore.

Jean-Théodore (1798-1836) became an apprentice in England. After the early death of his father, he returned to Geneva to take over for a few years the management of the family workshop, before turning his attention to civic and other technical matters and finishing his short life in France.

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Notes and References:

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8. P. Schulé, 'Une dynastie de "mécaniciens" et d'inventeurs, «les Paul»', *Genava*, N.S., 29

(1981) pp. 139-149. Download: <http://doc.rero.ch/record/13248>.

9. M. Archinard, *L'apport genevois à l'hygrométrie* (Geneva: Musée d'histoire des sciences, 1980). Also *Gesnerus*, 34, 1977, pp. 362-382.

10. Schweppe (1740-1821), born in Germany but living in Geneva, had invented in 1783 a process to produce carbon dioxide and dissolve it into water. In the partnership, Nicolas Paul was the technician building the machinery. The brand name 'Schweppes' is still known throughout the world.

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