A BRIEF HISTORY OF THE BALANCE IN SOCIETY

H. R. Jenemann and E. Robens
Institut für Anorganische Chemie und Analytische Chemie, Johannes Gutenberg-Universität
D-55099 Mainz, Germany

Abstract

One of the earliest measuring instruments used by human beings was the balance; evidence of this dates back more than 5,000 years. Initially, the weights of goods were measures rather of value than of mass. Besides yardsticks and graduated cups, scales are today the most widespread instruments, found in almost all laboratories, factories and households. Indeed, the balance accompanies us from birth to death.

The balance very early achieved a metaphorical meaning and was used for the comparison of ethical values. It first appeared as an instrument in the death tribunal in Egyptian religion and later in Christianity. In the hands of the Grecian Gods, weighing was a deciding factor as concerns victory or death. In Judaism and for the Romans, scales become the symbol of justice. Several trade and handicraft guilds currently use the balance as an attribute, demonstrating in this way their sincerity and accuracy. The balance is of dubious significance in astrology, as one of the signs of the zodiac.

Keywords: balance, history of techniques, scales, social history, weighing

Introduction

The vacuum balance is a rather young instrument: its history goes back 140 years for the vacuum macrobalance [1] and 80 years for the vacuum microbalance [2]. In contrast, the balance itself is a very old instrument, with 5,000-year-old findings [3].

History of balance

Figure 1 shows the oldest balance beam known, found in Upper Egypt, made of limestone and only 6 cm long. Figure 2 depicts a mural painting from an Egyptian tomb, with a set of weights and two balance beams [4]. It is an early demon-
Fig. 1 Oldest balance beam known, probably pre-dynastic, found in Upper Egypt. 6 cm long, limestone. Petrie Collection, London.

Fig. 2 Mural painting of a wooden box containing two wooden balance beams 20.3 and 34.3 cm long. A set of weights, rectangular blocks of black stone, is marked in an ascending series up to 100 units. Assuming that this stone is basalt, we obtain the Egyptian national standard of the Quedet=144 Grains=9.3 g. Tomb of Hesy, Saqqarah, 3rd Dynasty, 2650 B.C.

stration of standardization work. Disregarding some primitive tools such as yardstick and calibrated beakers, we can say that the balance was the earliest measuring instrument [5, 6]. Today, scales are the most widely used instruments, found in almost all laboratories [7], factories and households.

Old Egyptian pictures demonstrate the use of the balance for weighing tributes and tax duties. Precious metals were weighed in order to control the goldsmith [8] (Fig. 3). In metallurgical workshops, the constituents of alloys were weighed. However, in market scenes from the Old Empire, no balance can be detected, because commerce in those times primarily involved barter, without the use of measures [9]. Initially, by means of weighing, not the mass was deter-

Fig. 3 Egyptian workshop with jewellers and joiners. At the upper left, gold is weighed. Tomb Neb-Amun and Ipuki, Scheek abd el Gurna No. 181. 1500 B.C.