

FAUSTMANN AND THE INVENTION OF DAS SPIEGEL-HYPSOMETER

The first three papers in this issue were papers presented at the 150:th anniversary conference to honor the appearance of Martin Faustmann's famous paper in *Allgemeine Forst- und Jagdzeitung, Berechnung des Wertes, welchen Waldboden, sowie noch nicht haubare Holzbestände für die Waldwirtschaft besitzen*. The paper was reprinted in an English version in the first issue of this journal under the title *Calculation of the Value which Forest Land and Immature Stands Possess for Forestry* (*J.F.E.*, 1995, 1, 7–44).

The conference took place 3–6 October 1999, outside Darmstadt at the Jagdschloss, Babenhausen in the vicinity of the area where Faustmann worked as a forester. From 1848–1857 he was responsible for the forests of the Grand Duchess of Hessen and, in 1857, he became responsible for die Oberförsterei Dudenhofen with headquarters in Babenhausen, where he stayed until his death in 1876.

Faustmann was born in Giessen in 1822 and he studied forestry at Giessen University and later in Darmstadt¹. His career as a scientist is essentially confined to the period 1847–1855 during which he helped G.W.von Wedekind to edit *Allgemeine Forst- und Jagdzeitung*. This journal was published in Frankfurt am Main. The 1849 paper is the first paper he published. It was followed by three related papers, two published in 1853, and one in 1854. The first two were concerned with the relationship between the land value and the value of the stand, and the third focused on how to calculate the value of young stands². All three papers seem to be written without much inspiration. You can, for example, wonder why it is interesting to know the age at which the value of the stand equals the value of the land, which is the topic of the second paper published in 1853.

¹ Professor Carl Heyer was one of his teachers.

² Das Verhältnis zwischen Holtz und Bodenwert, *Allgemeine Forst- und Jagdzeitung*, 1853, 204–210, In welchem Alter sind Holzbestände- und Bodenwerter einander Gleich, *Allgemeine Forst- und Jagdzeitung*, 1853, 364–68, and Wir berechnet man den Geldwert junger, noch nicht haubarer Holtzbestände, oder überhaupt den Produktionswert eines Holzbestandes, *Allgemeine Forst- und Jagdzeitung*, 1854, 81–86 and 330–332.

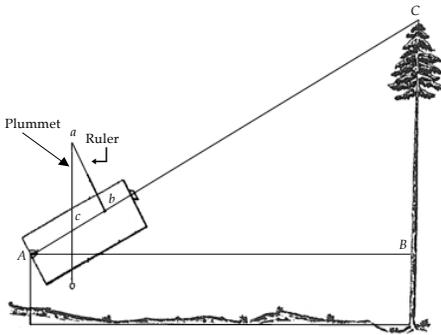


FIGURE 1. FAUSTMANN'S SPIEGEL-HYPSOMETER

Most of his later work was on Silviculture, and like many foresters at the time he invented an instrument that could be used in silvicultural practice. Das Spiegel-Hypsometer (The Mirror-Hypsometer) was invented in 1856 to estimate the height of the trees³.

The idea is to use two similar right angled triangles, one within the instrument, and one that has the distance to the tree and the height of the tree less the height of the observer as its two smaller sides. A prototype is shown in Figure 1 above.

By pointing at the top of the tree, through the diopter sight, the plummet creates one triangle, abc , which is similar to ABC . (Why?) This means that $BC/AB = bc/ab$, which gives $BC = AB(bc/ab)$. Since AB is easily measured, and bc and ac are known within the instrument, you get the height of the tree by adding the length of the observer to BC .

Faustmann writes that, in order to measure the height of the tree, it is necessary to have an instrument that is easy to transport, and easy to use. It is true that his method is ingenious and simple, but one might wonder why he does not, as a Jägermeister, suggest that one connects a ruler and a plummet to a hunting rifle. Such an instrument would not be particular easy to carry, but since a forester, at the time, carried his hunting weapon anyway, it would not be an extra burden.

Faustmann's invention of the Spiegel-Hypsometer can of course not match his 1849 paper, but I thought it was interesting enough to let a new audience hear about it. The papers in this special issue, I am sure, speak for themselves.

Karl-Gustaf Löfgren / Guest Editor

³ Das Spiegel-Hypsometer. Ein neues Instrument zum Höhenmessen, *Allgemeine Forst- und Jagdzeitung*, 1856, 441–447.