RENATE TOBIES

THE RECEPTION OF H. GRASSMANN’S MATHEMATICAL ACHIEVEMENTS BY A. CLEBSCH AND HIS SCHOOL

The dissemination of Grassmann’s ideas to the larger mathematical public in Germany intensified with the interest in this scholar’s achievements shown by Alfred Clebsch (1833-1872) in the early 1870s. The premature death of Clebsch prevented him from deepening his adaptation, but the friends and disciples in the Clebsch school continued the reception of Grassmann’s work. I intend to show the important role of Clebsch’s school, and in particular that of Felix Klein (1849-1925) in making Grassmann’s work accessible.

It was Clebsch’s scientific biography of Julius Plücker (1801-1868)\(^1\) which prompted an enhanced reception of Grassmann’s mathematical works. Clebsch supported Viktor Schlegel’s efforts to propagate Grassmann’s results and wrote to him on 21 November, 1871:

“I hope that science will benefit from the methods of Mr. G: and your presentation of the same, and I am most interested in both...I would consider every more precise presentation of any parts of G’s methods and results most desirable ...” (Grassmann 1911, p. 400).

In 1896 when Schlegel presented a history of the reception of Grassmann’s Ausdehnungslehre, he listed 179 titles connected with this oeuvre in some way (Schlegel 1896). The propagation of Grassmann’s ideas was further promoted by the Gesammelte Werke which were being published since 1894 (in connection with the 50th anniversary of the Ausdehnunglehre). In the meantime, related publications had become so numerous that Friedrich Engel (1861-1941), in the last volume of the Gesammelte Werke published in 1911, decided - contrary to the original

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\(^1\) Clebsch commented in this obituary, first published in 1872, on the relation between synthetic analytic methods in geometry and underlined the key achievements of Grassmann: “For me these [the analytic methods] include the concept of general curves and surfaces which was only explained much later by purely synthetic means in Grassmann’s profound works.” In a note, Clebsch remarked: “Regrettably, the excellent works of this very important geometer are still too little known. This must mainly be attributed to the fact that in Grassmann’s presentation, these geometric results occur as corollaries to much more general and very abstract investigations which, in their unusual form, present the reader with considerable difficulties.” (Clebsch 1895, p. XV).

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plan - against including an index of publications initiated by Grassmann's work (see Grassmann 1911, p. VII).

1. THE SPECIAL INTEREST OF THE CLEBSCH SCHOOL IN PROPAGATING GRASSMANN'S IDEAS

Despite the short period between Clebsch becoming acquainted with the Ausdehnungslehre and his death in November 1872, he still managed to set an important starting point for the enhanced reception of Grassmann's results. He helped Grassmann obtain an important honor by having him accepted as a corresponding member of the Gesellschaft der Wissenschaften in Göttingen (2 December 1871) and, somewhat as his legacy, his own disciples became active in promoting Grassmann's work. It is quite revealing that Clebsch's friends emphasized, in their scientific biography of Grassmann, the latter's "extraordinary merits" in establishing the "process of general geometric development" (Clebsch 1873, p. 12).

The following mathematicians belonged to the first generation of Clebsch students who were particularly active in promoting and disseminating Grassmann's ideas: Paul Gordan (1837-1912), Olaus Henrici (1840-1918), Alexander Brill (1842-1935), Max Noether (1844-1921), Jakob Lüroth (1844-1910), Aurel Voß (1845-1931), Felix Klein and Ferdinand Lindemann (1852-1939).² Eduard Study (1862-1930), who used Clebsch-Aronhold symbolic in the invariant theory, also said that Clebsch had been his scientific mentor (Weiss 1930, p.54).

The majority of Clebsch's students were familiar with Grassmann's ideas and propagated them in various ways: by means of their own publications which were linked to Grassmann's works; by disseminating his theories in their own lectures; by actively participating in publishing his Gesammelte Werke; by encouraging doctoral theses on related topics; by describing Grassmann's mathematical methods in the great project of an encyclopedia of mathematics and their applications, and by presenting them in publications intended to popularize science.

Grassmann's system had model character for Clebsch, and for some of his disciples in their search for a systematic of their own. It prompted further a research program characterized by the search for connections between geometry, algebra and function theory, focusing, according to the Clebsch school, on "new" geometry (algebraic geometry) and "new" algebra (invariant theory).

² For the relations among Alfred Clebsch's students see Section 2 in (Tobies 1992).