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Anatomical models by F.J. Steger (1845-1938): the University of Otago Collection

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To the Editors, *European Journal of Anatomy*:

Anatomical models have been used for centuries as an adjunct to teaching anatomy, and play an important role in the history of anatomical education. Often used for teaching anatomy throughout the 16th to 20th centuries, models became more popular over this time for such reasons as the public disapproval of grave-robbing to supply cadavers, the changing law in relation to accessing and using human material, and the growing need to supply anatomical specimens for the increasing number of students participating in medical training (Hopwood, 2007). Anatomical models are still widely used today, and have been shown to have educational benefits that indicate that they are not redundant in this current age of technology and e-learning (Pawlina and Drake, 2013; Preece et al., 2013). Recent research indicates that there are advantages to using models over 3D models and textbooks in learning imaging anatomy (Preece et al., 2013), indicating anatomical models should not be consigned to dusty shelves or locked away in cupboards at this present moment – they are still useful and serve a purpose in current anatomical teaching. This brief report details a collection of Steger plaster cast models that is perhaps unique because of its size and quality, providing information on the collection for the purpose of highlighting both the pieces and their maker's place in the history of anatomical education.

The Sicilian abbot Gaetano Guilio Zummo (1656-1701) is credited as the first person to have prepared modern anatomical models, using his skill to create wax copies of the dissections by Guillame Desnoues (1650-1735) (Ballestriero, 2010; Riva et al., 2010). Various other means have been used to make anatomical models, i.e., wood, papier-maché, ivory and silk (Markovic and Markovic-Zivkovic, 2010). However, until the late nineteenth century their manufacture was laborious, costly, and often imprecise (Spencer, 2008). The German technician Franz Josef Steger (1845-1938) (Fig. 1), under the guidance of Professor Wilhelm His (1831-1904, University of Leipzig), revolutionized anatomical models in the 1880s by developing a fast and accurate method of producing plaster-cast models. This was partly based on the suggestion of Prof. His that the body parts be frozen prior to dissection and casting, a technique that prevented movement of the body parts and organs and allowed a more 'natural' placement of the muscles, organs and bones, thus so creating a more realistic model (Spencer, 2008). Models that were developed by Steger included those of limbs, torsos, embryos, and heads amongst a wide variety of anatomical specimens that are presented in various states of dissection (Fig. 2). Many of these in the current Museum collection were mounted on bases, and some set on pedestals that could be rotated (Fig. 2A), or including draws containing information on the section at hand (Figs. 2, D, E, F).

His-Steger plaster-cast models proved popular, and were mass-produced for many decades from the late 1880s until the early 1930s (Spencer, 2008). First acquired by the University of Otago around 1882 under the guidance of the then Head of Department Professor John Halliday Scott, a generous collection of Steger models (both His-Steger and earlier collaborative productions of

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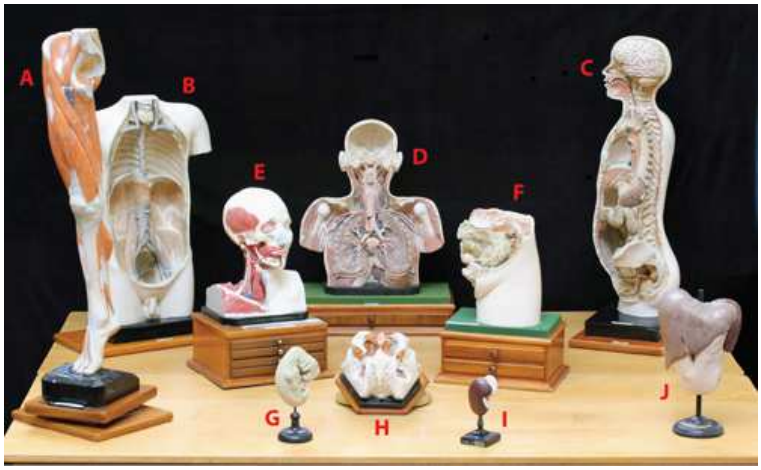

Fig. 1 (Left). Franz Josef Steger (1845-1938), from the original Steger catalogue of the Anatomischen Institut der Universitat Leipzig, circa 1900.

Fig. 2 (right). Examples of Steger models from the University of Otago collection. Pieces described by region allocated for the audit. **A**. Lower limb; **B**. Torso; **C**. Torso; **D**. Thorax; **E**. Head and neck; **F**. Pelvis; **G**. Embryo; **H**. Pelvis; **I**. Abdomen; **J**. Abdomen.

Bock-Steger) was purchased and imported to New Zealand. Steger models are of significant historical interest because of their contribution to anatomical teaching from the late nineteenth century to the present day, and replicas of much of this particular collection (the originals are on display only) are still used in the teaching of anatomy in post-graduate anatomy courses at the University of Otago. We undertook an audit of our collection to determine the number, variety and quality of Steger anatomical models held by the Department of Anatomy, University of Otago.

Seventy-seven plaster cast models of different sizes were identified by the existence of the 'Steger' maker's stamp (Fig. 3). Model quality was independently assessed by three examiners using predetermined descriptors (poor, fair, good, very good, excellent). Each piece was categorized by size (small <150mm xyz, medium 150mm-400mm xyz, large >400mm xyz) and region. The majority (73%) of the pieces in the collection were rated as 'good' condition or better,

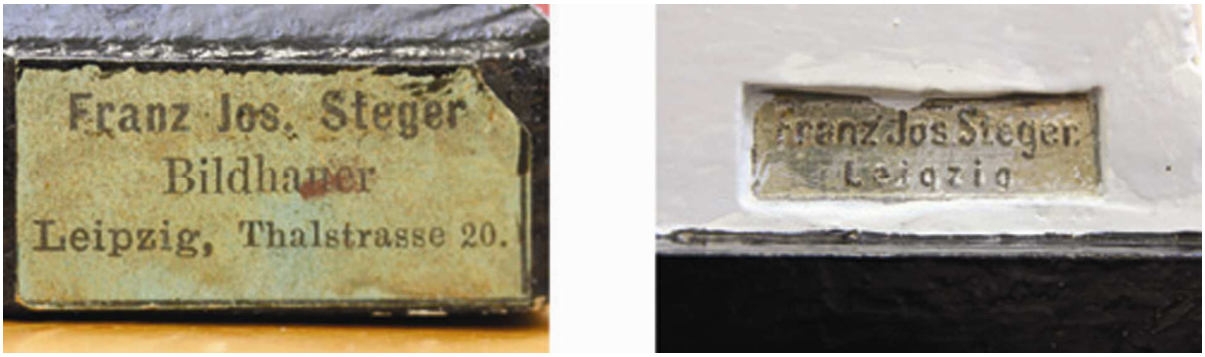

Fig. 3. Examples of two of the Steger name plates, used to identify original pieces.

Table 1. Numbers of Steger models from known international collections

Institution and location	Number of Steger models held
University of Otago, New Zealand	77
University of Munster, Germany	59
University of Melbourne, Australia	14
University of St. Andrew's, Scotland	14
University of Edinburgh, Scotland	13
University of Aberdeen, Scotland	11
Humboldt University, Germany	7

with 44 large, 20 medium, and 13 small pieces. The pieces were distributed across all body regions (Fig. 4), including pieces detailing embryology, limbs, head and neck, thorax, and whole torsos, with the most pieces from the abdomen/pelvis region. Given its age, construction and use, the collection is in remarkably good condition with possibly the worst damage imparted during previous mold making for fibreglass replicas that were made during the late 20th century to cater for the growing number of students, and to protect the originals by removing them from day-to-day use. The quality of paintwork on the models was also variable, with some having been repainted. There are a further 28 models attributed to Steger in the Otago collection, but without a makers plate to allow identification these were not considered for assessment.

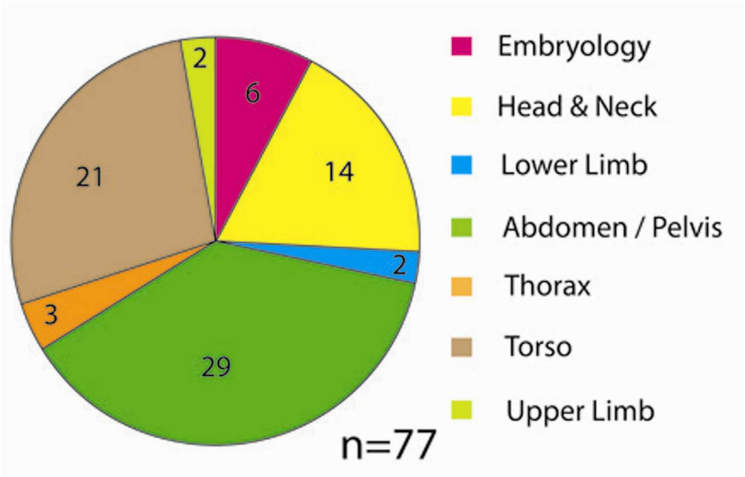

Fig. 4. Distribution of models held in the University of Otago collection, shown by body region.

This collection, when compared to other known holdings (Table 1), is significant because of its size. It is possibly one of the largest Steger collections in the world, with the largest other collection known to the authors being 59 items (University of Munster, Germany). Other institutions that are known to hold Steger collections include the University of St Andrews, the University of Melbourne, the University of Edinburgh, the University of Aberdeen, and Humboldt University. Leipzig University had a collection of original Steger models but these were destroyed in 1943. However, they nowadays have 15 pieces that were made from the original Steger molds after this time.

The University of Otago Steger model collection represents a diverse and high quality assortment of anatomical models. With individual pieces advertised at many thousands of dollars on internet auction sites, the collection is also of considerable financial value. We believe such collections are valuable not only because of their use, their financial worth, or the educational benefit they are still able to provide, but because they are remnants of an anatomical era that was part art and part science. These collections are therefore of historical significance, and should be treasured as items that help record the progress of anatomical teaching. These items also champion the individuals – like Franz Josef Steger – who helped shape anatomy education, and play an important part in creating a historical identity for the profession. Documentation and maintenance of such collections are important as they provides a window to the past, allowing anatomists an appreciation of how the teaching and science of anatomy have evolved over the centuries.

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