

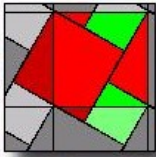


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Features



Bibliography



Perigal bibliography

- **On geometric dissections and transformations** in volume 1 of *The Messenger of Mathematics* and **On geometric dissections and transformations II.** in volume 2 of *The Messenger of Mathematics* (1874–5), both by Henry Perigal.

These two articles were as close as Henry Perigal came to orthodox scientific publication. He was the author of many other items, but nearly all probably at his own expense. These two were solicited by his friend and colleague James Glaisher, an orthodox professional mathematician (author of several articles on mathematics in the *Encyclopaedia Britannica*, for example), whose comments are included at the end of the first. The first one contains the famous dissection proof of Pythagoras' Theorem, while the second shows how to dissect a square and rearrange the pieces so to make up a rectangle of given length. (This is the converse of Euclid's II.14.)

[Link](#) to copies of the two articles

- **Geometric dissections and transpositions**, by Henry Perigal, published under the auspices of the *Association for the Improvement of Geometrical Teaching*.

This very brief pamphlet contains an extract from the *Messenger of Mathematics* articles, and a sequence of dissection diagrams, probably engraved on wood by Henry himself, without comment.

[Link](#) to one of the dissections from this pamphlet

- **Trochoidal curves** by Augustus De Morgan in volume XXV of the *Penny Cyclopaedia*, Charles Knight & Co, London, 1836.

Bibliography

This is just one, although by no means one of the most interesting, of the huge number of articles contributed to Charles Knight's encyclopaedia by De Morgan. Most of them, especially those on the history of mathematics, are very readable even though somewhat out of date.

- **A Budget of Paradoxes** by Augustus De Morgan, Dover reprint, 1954.

This is a collection of De Morgan's articles on cranks (or *paradoxers*, as he called them) from the *Athenaeum*, made by his wife after his death.

- **Henry Perigal, a short record of his life and works** by Frederick Perigal, Bowles & Sons, London, 1901.
- Otto Negebauer, **Mathematische Keilschritte–Texte**, Springer–Verlag, 1935.

Table 3 of Part II is a photograph of the Babylonian tablet BM (British Museum) 15285. The middle two images have a striking affinity with Perigal's dissection for the isosceles right triangle. The Babylonians certainly knew that in some sense the ratio of the diagonal of a square to a side was a square root of 2.

- Aydin Sayili, **Thabit ibn Qurra's generalization of the Pythagorean Theorem**, *ISIS* **47** (1956), pages 35–37.
- Paul Mahlo, **Topologische Untersuchungen über Zerlegung in ebene und sphärische Polygone**, Dissertation, Halle, 1908.
- Major P. MacMahon, **Pythagoras's Theorem as a repeating pattern**, *Nature* **109** (1922), page 479.
- Felix Bernstein, **Der Pythagoräische Lehrsatz**, *Zeitschriften für Mathematischen und Naturwissenschaftlichen Unterricht* **55** (1924), pages 204 – 207.

It was apparently Paul Mahlo who first pointed out that one could obtain a continuous family of dissection proofs of Pythagoras' Theorem by overlaying two tilings of the plane. This was discovered independently by at least a few others, notably Major MacMahon and Felix Bernstein.

- V. G. Boltyanskii, **Equivalent and indecomposable figures**, translated from the Russian, 1956.

This very pleasant book deals with the theory of dissections in two and three dimensions. In two dimensions, the principal result, formulated explicitly and proven early in the nineteenth century, is that two polygonal regions of equal area can always be dissected into matching congruent pieces. It can be argued that Euclid's treatment of area depends implicitly on this observation.

- Johan L. Dupont and Chih–Han Sah, **Homology of Euclidean groups of motions made discrete and Euclidean scissors congruences**, *Acta Mathematica* **164** (1990), pages 1 – 27.

This is just one of a series of papers written by Dupont and Sah integrating the theory of dissections into modern mathematics.

- **Dissections: Plane & Fancy** by Greg Frederickson, Cambridge University Press, 1997.

My debt to Greg is enormous. It was he who started me on my quest to discover what I could about Henry Perigal, and in particular it was he who told me about the grave. It was also he who told me about Pythagoras tilings. And it was Greg who noticed that among 'respectable' institutions, it is Cambridge University that has contributed most to the topic of dissections.

[Link](#) to Greg's web page about dissections



Bibliography

Plus is part of the family of activities in the Millennium Mathematics Project, which also includes the NRICH and MOTIVATE sites.