

**John A. Arredondo, Camilo Ramírez Maluendas**  
*On the Infinite Loch Ness monster*

Comment.Math.Univ.Carolin. 58,4 (2017) 465–479.

**Abstract:** In this paper we introduce the topological surface called *Infinite Loch Ness monster*, discussing how this name has evolved and how it has been historically understood. We give two constructions of this surface, one of them having translation structure and the other hyperbolic structure.

**Keywords:** Infinite Loch Ness monster; tame Infinite Loch Ness monster; hyperbolic Infinite Loch Ness monster

**AMS Subject Classification:** 51M15

REFERENCES

- [Abi81] Abikoff W., *The uniformization theorem*, Amer. Math. Monthly **88** (1981), no. 8, 574–592.
- [ARM] Arredondo J.A., Ramírez Maluendas C., *On infinitely generated Fuchsian groups of some infinite genus surfaces*, preliminary manuscript.
- [ARMV17] Arredondo J.A., Ramírez Maluendas C., Valdez F., *On the topology of infinite regular and chiral maps*, Discrete Math. **340** (2017), no. 6, 1180–1186.
- [Bea84] Beardon A.F., *A Premier on Riemann Surfaces*, London Mathematical Society Lecture Note Series, 78, Cambridge University Press, Cambridge, 1984.
- [CC78] Cantwell J., Conlon L., *Leaf prescriptions for closed 3-manifolds*, Trans. Amer. Math. Soc. **236** (1978), 239–261.
- [CC77] Cantwell J., Conlon L., *Leaves with isolated ends in foliated 3-manifolds*, Topology **16** (1977), no. 4, 311–322.
- [CBG08] Conway J.H., Burgiel H., Goodman-Strauss C., *The Symmetries of Things*, A K Peters, Ltd., Wellesley, Massachusetts, 2008.
- [Cox36] Coxeter H.S.M., *Regular skew polyhedra in three and four dimension, and their topological analogues*, Proc. London Math. Soc. (2) **43** (1937), no. 1, 33–62.
- [FK36] Fox R.H., Kershner R.B., *Concerning the transitive properties of geodesics on a rational polyhedron*, Duke Math. J. **2** (1936), no. 1, 147–150.
- [Ghy95] Ghys É., *Topologie des feuilles génératrices*, Ann. of Math. (2) **141** (1995), no. 2, 387–422.
- [Hil00] Hilbert D., *Mathematical problems*, Bull. Amer. Math. Soc. (N.S.) **37** (2000), no. 4, 407–436; reprinted from Bull. Amer. Math. Soc. **8** (1902), 437–479.
- [HS06] Hubert P., Schmidt T.A., *An introduction to Veech surfaces*, Handbook of dynamical systems, 1B, Elsevier B.V., Amsterdam, 2006, pp. 501–526.
- [Kat92a] Katok S., *Fuchsian Groups*, Chicago Lectures in Mathematics, University of Chicago Press, Chicago, IL, 1992.
- [KZ75] Katok A.B., Zemljakov A.N., *Topological transitivity of billiards in polygons*, Mat. Zametki **18** (1975), no. 2, 291–300 (Russian).
- [KMS86] Kerckhoff S., Masur H., Smillie J., *Ergodicity of billiard flows and quadratic differentials*, Ann. of Math. **124** (1986), no. 2, 293–311.
- [Ker23] Kerékjártó B., *Vorlesungen über Topologie I*, Mathematics: Theory & Applications, Springer, Berlin, 1923.
- [KZ03] Kontsevich M., Zorich A., *Connected components of the moduli space of abelian differentials with prescribed singularities*, Invent. Math. **153** (2003), no. 3, 631–678.
- [Lox81] Loxtion J.H., *Captain Cook and the Loch Ness Monster*, James Cook Mathematical Notes **27** (1981), no. 3, 3060–3064.
- [Lox83] Loxtion J.H., *The graphs of exponential sums*, Mathematika **30** (1983), no. 2, 153–163.
- [Ma88] Maskit B., *Kleinian Groups*, Grundlehren der Mathematischen Wissenschaften [Fundamental Principles of Mathematical Sciences], 287, Springer, Berlin, 1988.
- [MT02] Masur H., Tabachnikov S., *Rational billiards and flat structures*, Handbook of dynamical systems, 1A, North-Holland, Amsterdam, 2002, pp. 1015–1089.
- [Mol06] Möller M., *Periodic points on Veech surfaces and the Mordell-Weil group over a Teichmüller curve*, Invent. Math. **165** (2006), 633–649.

- [MR] Muciño-Raymundo J., *Superficies de Riemann y Uniformización*, [http://www.matmor.unam.mx/~muciray/articulos/Superficies\\_de\\_Riemann.pdf](http://www.matmor.unam.mx/~muciray/articulos/Superficies_de_Riemann.pdf)
- [Nis75] Nishimori T., *Isolated ends of open leaves of codimension-one foliations*, Quart. J. Math. **26** (1975), no. 1, 159–167.
- [PS81] Phillips A., Sullivan D., *Geometry of leaves*, Topology **20** (1981), no. 2, 209–218.
- [PSV11] Przytycki P., Schmithüsen G., Valdez F., *Veech groups of Loch Ness monsters*, Ann. Inst. Fourier (Grenoble) **61** (2011), no. 2, 673–687.
- [RMV17] Ramírez Maluendas C., Valdez F., *Veech group of infinite-genus surfaces*, Algebr. Geom. Topol. **17** (2017), no. 1, 529–560.
- [Ric63] Richards I., *On the classification of noncompact surfaces*, Trans. Amer. Math. Soc. **106** (1963), 259–269.
- [Son75] Sondow J., *When is a manifold a leaf of some foliation?*, Bull. Amer. Math. Soc. **81** (1975), no. 3, 622–624.
- [Spe49] Specker E., *Die erste Cohomologiegruppe von Überlagerungen und Homotopie-Eigenschaften dreidimensionaler Mannigfaltigkeiten*, Comment. Math. Helv. **23** (1949), 303–333.
- [Spi79] Spivak M., *A comprehensive introduction to differential geometry*, Vol. I, second edition, Publish or Perish, Inc., Wilmington, Del., 1979.
- [Ste97] Steuart C., *The Loch Ness Monster: The Evidence*, Prometheus Books, USA, 1997.
- [Val09] Valdez F., *Infinite genus surfaces and irrational polygonal billiards*, Geom. Dedicata **143** (2009), 143–154.