

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

JORULLO

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)



Dr Gadow in Mexico on the journey home.

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

JORULLO

THE HISTORY OF THE VOLCANO OF
JORULLO AND THE RECLAMATION
OF THE DEVASTATED DISTRICT BY
ANIMALS AND PLANTS

By

HANS GADOW, M.A., PH.D., F.R.S.

LATE STRICKLAND CURATOR AND READER
IN VERTEBRATE MORPHOLOGY IN THE
UNIVERSITY OF CAMBRIDGE

CAMBRIDGE

AT THE UNIVERSITY PRESS

1930

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Mexico City

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9781107670426

© Cambridge University Press 1930

This publication is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without the written
permission of Cambridge University Press.

First published 1930
First paperback edition 2013

A catalogue record for this publication is available from the British Library

ISBN 978-1-107-67042-6 Paperback

Cambridge University Press has no responsibility for the persistence or
accuracy of URLs for external or third-party internet websites referred to in
this publication, and does not guarantee that any content on such websites is,
or will remain, accurate or appropriate.

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

CONTENTS

	PAGE
Editorial Note. By Philip Lake	vii
Prefatory Note. By A. C. Seward	ix
Author's Preface	xi
Jorullo and its Surroundings. (A preliminary sketch.) By Philip Lake	xv
Chap. I. The Story of the whole Drama	I
II. The Process and Progress of Reclama- tion of the Devastated District. (<i>a</i>) Plants	22
III. The Process and Progress of Reclama- tion of the Devastated District (<i>cont.</i>). (<i>b</i>) Animals	49
IV. The Amphibia and Reptilia of Micho- acan	65
Appendix. Extracts from the Literature con- cerning Jorullo	76

ILLUSTRATIONS

Dr Gadow in Mexico on the journey home *Frontispiece*Fig. 1. Jorullo from La Playa, with the Malpais
in front. Sketch by Mrs Gadow . *to face p. 1*Fig. 2. Jorullo from the Mata de Plátano.
Sketch by Mrs Gadow . . . *to face p. 1*

Map of Jorullo

available for download from www.cambridge.org/9781107670426

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

EDITORIAL NOTE

THE MS of this work was left by Dr Gadow in a condition almost ready for press. A few references were missing, a few small points remained to be cleared up, and Dr Gadow had made notes for a final revision. With the help of these it has been possible to complete the MS nearly in the form in which he would himself have put it, excepting only that he had also intended to insert the genus and species of the plants to which he refers by their Mexican names. Where his emendations could not be incorporated verbally a note has been added giving their substance. To distinguish these and other explanatory notes from those of Dr Gadow himself such notes have been initialled.

The references have been completed and obvious slips have been corrected. In order to render Dr Gadow's story of the eruption more easily intelligible to those unacquainted with the district a short preliminary description has been prefixed, and for the same purpose occasional small verbal changes have been made in the text.

The illustrations of the volcano and its surroundings are from sketches by Mrs Gadow. In the map which has been added, the geological lines are from the map by Ordoñez, the contour-lines from that by Villafaña.

Dr Gadow contemplated the preparation of a second volume on Mexico, in addition to that which he had already published. It seems likely that after he had finished this MS he decided to keep it back for inclusion in the larger work.

PHILIP LAKE

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

PREFATORY NOTE

THOUGH unfamiliar with the district described by Dr Gadow, my long friendship with a former colleague and my interest in the facts here recorded make it a pleasure to accept the invitation of Mrs Gadow to contribute a prefatory note. Dr and Mrs Gadow, in the course of their journeys in several little-known parts of the world, have added greatly to our knowledge of natural history, especially of certain districts of Mexico. Jorullo affords a particularly instructive example of what may be called a large-scale experiment in Nature's laboratory—the destruction of vegetation over a wide range of country and the re-introduction of animals and plants by natural agencies. It tells much the same story as the volcanic island of Krakatao, which is a classical example of re-colonisation following devastation. In a recently published book (*The Problem of Krakatao as seen by a Botanist*) summarising the results of several expeditions to the island since the catastrophe of 1883, C. A. Backer puts forward a view which is opposed to that usually held. Prof. Treub, a former Director of the Buitenzorg Botanic Garden in Java, states that the terrific explosions and showers of ash of August 1883 had destroyed all animal and plant life. Botanists generally accepted his statement and regarded the present flora and fauna of the remnant of the devastated island of Krakatao as new introductions from neighbouring lands. Mr Backer suggests that the destruction was not complete, though it may be assumed that many of the plants which have

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

x

PREFATORY NOTE

re-clothed the ash-covered remains of the island were derived from external sources.

Jorullo differs from Krakatao in several important respects. It is not an island; the eruptions continued for some years; and great outflows of lava covered an area of about five square miles. There can be no doubt that throughout the lava-covered region all life was completely destroyed; but the destructive effect of showers of ash extended far beyond the reach of the lava. The total area in which life was completely or almost completely destroyed greatly exceeded that at Krakatao. But at Jorullo there was no barrier of sea to hinder the re-entrance of plants and animals.

A. C. SEWARD

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

AUTHOR'S PREFACE

WE went to see Jorullo and our visit extended to a whole month, so we did him thoroughly. Our special problem was to study the manner in which the devastated district had been reclaimed by the surrounding fauna, and perhaps to find the rate at which it had been, or was still, proceeding, because this is a factor about which very little is known. It may seem unnecessary to bring such a large apparatus to bear upon a question of zoological distribution, but the fauna is absolutely dependent upon the flora, and this depends upon the kind and condition of the ground. Here was a district, of more than fifty square miles, so fertile until the shock of September, 1759, that it was known by the Tarascan name Jorullo, the Paradise. In the midst of it a series of volcanoes arose and covered a square of several miles with lava, whilst for many miles around the country was smothered with volcanic ashes and sands. To tackle the whole problem of reclamation it was necessary to study the very varied features of the terrain, as to subsoil, water-supply and drainage, the probable roads of ingress taken by the new colonists, and, to arrive at an estimate of the devastation, to get a *tabula rasa*, a clean slate. I was familiar with Humboldt's account, and we had with us the pamphlets by Ordoñez and Villafaña published on the occasion of the Tenth International Geological Congress, a party of which paid a hurried visit to the Jorullo about 21 months before we appeared upon the scene. The accounts hitherto published do by no means agree—the

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

xii

AUTHOR'S PREFACE

history of the whole catastrophe is singularly garbled, and to us at least it seemed remarkable that even the Mexican authorities have scarcely attempted to sift critically and correlate the various printed accounts. No use has been made of the diary written by an educated man, an exposition of what happened during the first six weeks, although this diary has been reprinted by Villafaña in his most interesting pamphlet. Since it is written in Spanish, a language not very familiar to most readers, I have translated it.

We had plenty of time in camp, during our halcyon days at Mata de Plátano, and whilst roaming over the district, to ponder over the various points of discord, to verify this and to question that, until the whole drama seemed to re-enact itself. It would have been futile to trace the fauna on to Jorullo without knowing something of the fauna of the surrounding neighbourhood, and soon this task resolved itself into a chase which led to the very delta of the Balsas on the shore of the Pacific, and thence back, crossing the western half of the same volcano-studded depression of which the Jorullo district forms the eastern portion, and finishing up, rather abruptly with fever, on the much older Volcan de Tancitaro, which rises to beyond 13,000 feet.

Zoologically the southern half of the State of Michoacan was *terra incognita*—there has been some butterfly hunter and a collector of orchids. For the special purpose we had in view I have restricted myself almost entirely to Reptilia and Amphibia on account of their superior importance for questions of the mode and rate of distribution. Mammals are too few and to be got only by laborious trapping, and they roam about too

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

AUTHOR'S PREFACE

xiii

easily. Birds are hopeless, fishes too few—only five species have ever been recorded by ichthyologists from the whole of the Balsas basin, and from the Jorullo there was none. Reptilia and Amphibia alone are bound to their place; they do not migrate.

HANS GADOW

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

JORULLO AND ITS SURROUNDINGS

(A PRELIMINARY SKETCH)

UNTIL A.D. 1759 there was no hill where the Volcan de Jorullo now stands, nor were there any records of volcanic activity in the neighbourhood. The inhabitants did not even know what lava was. There were, indeed, volcanic hills close by, but these had long been extinct and had no meaning in their eyes. The eruptions, which began in 1759 and continued intermittently for several years, completely buried a tract of more than five square miles which had previously been famous for its fertility. The destructive effects extended over a very much wider area, and even at Queratero, 125 miles distant, ashes fell in abundance.

Historically the volcano is interesting because Humboldt, who visited it in 1803, described it as an elevation crater, formed in accordance with the theory of Von Buch. That theory has long been abandoned and the real interest of the eruption lies in the fact that full reports of the birth of the volcano, written by an eyewitness, were sent to the Viceroy at the time and were preserved in the Archives. These reports summarise the premonitory signs which had been observed for several months, and give a diary of events from September 29th, when the eruption began, to November 13th, on which date the second report closes. The reports were unknown to Humboldt and were first published in 1854 by Orozco y Berra. They have since been twice re-

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

xvi JORULLO AND ITS SURROUNDINGS

printed, but Dr Gadow seems to be the first who has seriously discussed their significance.

Jorullo stands in an amphitheatre amongst the foothills of the great southern slope of the Mexican plateau. The amphitheatre is roughly rectangular in shape, with its longer sides running from east to west and its shorter sides from north to south. It was closed on north, east, and south, but opened westward into the plain of La Playa and Agua Blanca, the opening being divided by the Cerro del Veladero. The amphitheatre is now filled by the products of the eruptions and its original floor is nowhere visible, but a single hill which stood in its midst still raises its summit through the lava flows. This is the Cerro Partido, and according to tradition the old Hacienda of Jorullo was situated in its vicinity.

The seat of the eruptions lay along the eastern side of the amphitheatre, where four distinct cones may now be seen, viz. Jorullo itself, the Volcancito del Norte to the north of it, and the Volcancitos de Enmedio and del Sur to the south (Fig. 1). A line joining the summits of these cones is nearly straight and runs approximately from east-north-east to west-south-west. It indicates, no doubt, the course of the fissure from which the eruptions took place.

The three Volcancitos and the southern half of Jorullo are formed, superficially, of volcanic ash and agglomerate; but the northern slope of Jorullo is covered by a sheet of lava proceeding from the present crater. Towards the east the cones abut against the hills which shut in the amphitheatre; but towards the west they slope down to an extensive field of lava which fills most of the amphitheatre and which is now known as the Malpais.

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

JORULLO AND ITS SURROUNDINGS xvii

According to Ordoñez the lava flows I and II, shown upon the map, were first extruded. An explosive phase followed and the four cones were built up. At a later date the smaller flows III and IV came from the vent of Jorullo. Dr Gadow believes that the first phase of the eruption was entirely explosive and that even the oldest flow did not take place till later. He was led to this view chiefly by the reports of Sáyago, to which reference has already been made. Sáyago, who was an eye-witness, describes showers of ashes, sometimes incandescent, and flows of sand or mud, but in his first report makes no mention of lava. The Viceroy evidently noted this omission and asked whether there were not flows of lava. In his second report Sáyago tries to answer the question. He says that he does not know what lava is like and has no one who can tell him, but he states definitely that nothing flows except the ashy material which he describes. It seems quite clear that up to November 13th there had been no great outburst of lava. Dr Gadow suggests that the flows began in 1764, when, according to common report, the eruptive activity reached its maximum.

In order to avoid danger of confusion it may be useful here to point out the differences between Ordoñez, Villafañá and Gadow with regard to the number and delimitation of the lava flows. Ordoñez distinguishes four, which are shown upon the map, numbered in order of succession. Villafañá recognises five, his IV being the portion of Ordoñez' III which is nearest to Jorullo, and his V the equivalent of Ordoñez' IV. Gadow gives no map of the flows, but from his description it is clear that his fifth flow, which he thinks

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

xviii JORULLO AND ITS SURROUNDINGS

came from the Volcancito del Norte, is the semi-detached northernmost portion of Ordoñez' II. His sixth flow forms the Calle de las Ruinas, a conspicuous trough-like channel which starts northwards from the Jorullo crater and bends towards the east, widening and shallowing as it goes. The Mexican geologists consider this as merely the last phase of the flow that covers the northern slope. A thin stream of lava continued to run beneath the crust after the rest of the flow had solidified, and the roof afterwards fell in.

P. L.

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-67042-6 - Jorullo: The History of the Volcano of Jorullo and
the Reclamation of the Devastated District by Animals and Plants

Hans Gadow

Frontmatter

[More information](#)



Fig. 1. View of Jorullo from La Playa, with the Malpais in front, the Volcancito del Norte to the left of the main cone and the Volcancito de Enmedio on the right. Sketch by Mrs Gadow.



Fig. 2. View of Jorullo from the Mata de Plátano. Sketch by Mrs Gadow.