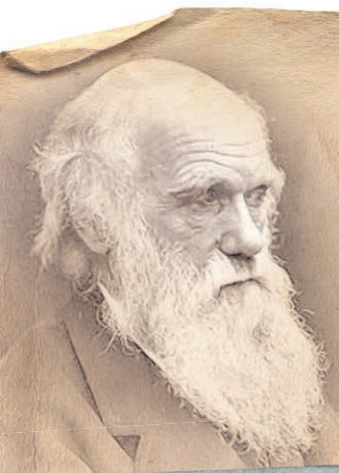
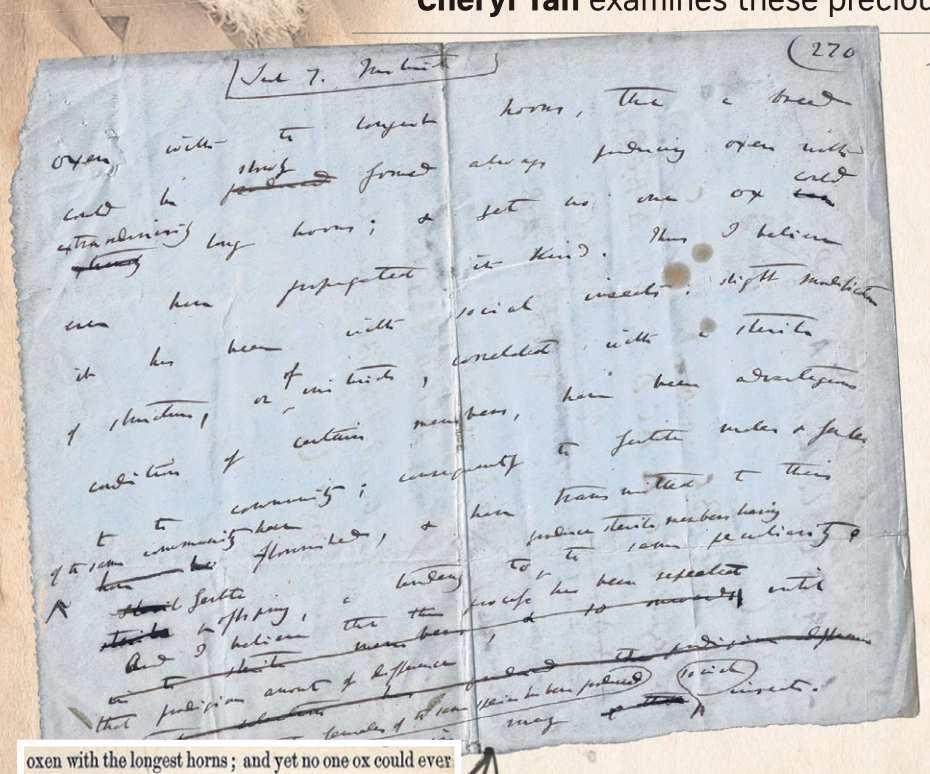
Lost and Found:
Darwin's world of evolution



Manuscripts from the father of evolution, Charles Darwin, have surfaced recently, including handwritten drafts of his seminal book On The Origin Of Species, along with rare letters written by the English naturalist. **Cheryl Tan** examines these precious manuscripts.



oxen with the longest horns; and yet no one ox could ever have propagated its kind. Thus I believe it has been with social insects: a slight modification of structure, or instinct, correlated with the sterile condition of certain members of the community, has been advantageous to the community: consequently the fertile males and females of the same community flourished, and transmitted to their fertile offspring a tendency to produce sterile members having the same modification. And I believe that this process has been repeated, until that prodigious amount of difference between the fertile and sterile females of the same species has been produced, which we see in many social insects.

versally, fertile. Nor is this nearly general and perfect fertility surprising, when we remember how liable we are to argue in a circle with respect to varieties in a state of nature; and when we remember that the greater number of varieties have been produced under domesti-

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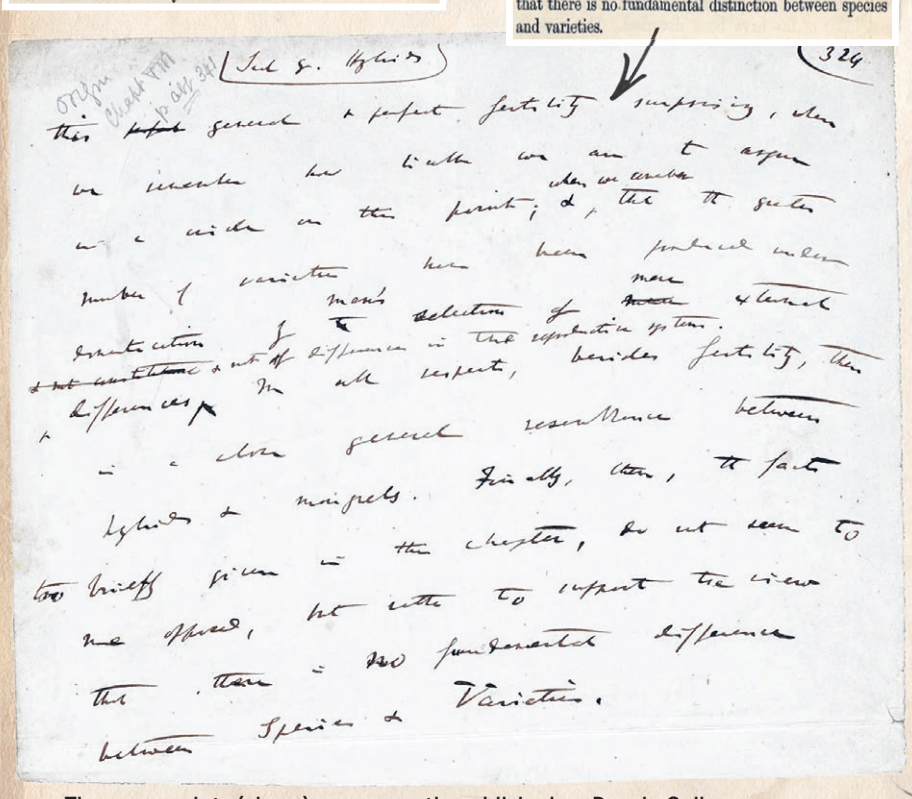
cation by the selection of mere external differences, and not of differences in the reproductive system. In all other respects, excluding fertility, there is a close general resemblance between hybrids and mongrels. Finally, then, the facts briefly given in this chapter do not seem to me opposed to, but even rather to support the view, that there is no fundamental distinction between species and varieties.



The manuscripts (above) were recently published on Darwin Online, helmed by Dr John van Wyhe, a historian of science and senior lecturer at the National University of Singapore.

THE ORIGINAL MANUSCRIPTS

- These artefacts come exactly 161 years after the initial publication of On The Origin Of Species on Nov 24, 1859.
- The first draft of the book was written by hand, but the significance of his work was not yet known at that time, so almost all the manuscripts were lost.
- Some pieces, however, were preserved by his children who had even used them as their own drawing paper!

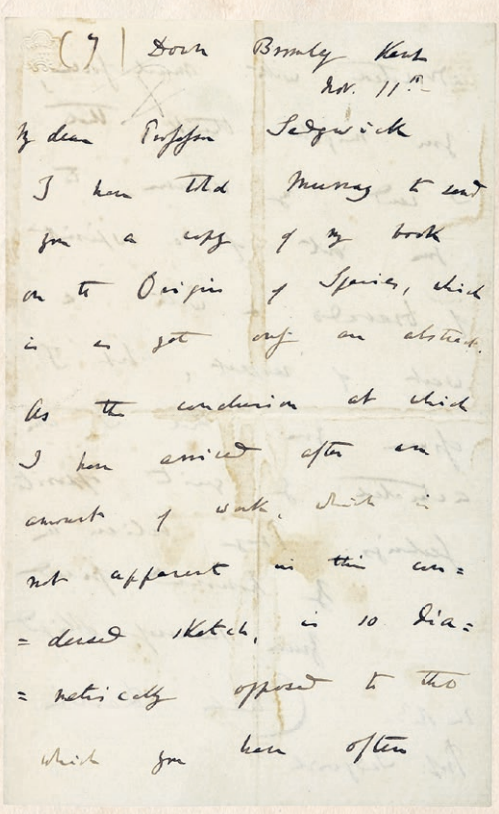
With these two new pages that have been recovered, there are now a total of

9 pages from Darwin's original draft.

Many of these pages are now worth around half a million dollars each at collectors' auctions.

- Darwin's handwriting was known to be "notoriously difficult to read", so the documents have been transcribed.
- When viewed side by side with the published paragraphs in the book, we are able to see slight differences and variations in the sentences and phrasing of the paragraphs, as these have been refined for the published text.

THE LETTER



- One of the letters sent by Darwin was addressed to his former geology professor at the University of Cambridge, Adam Sedgwick, in 1859.
- His professor was against the idea of evolution, thus explaining Darwin's nervousness in sending over a copy of his new book, which was known to be radical at that time.

ON EVOLUTION & THE GALAPAGOS ISLANDS

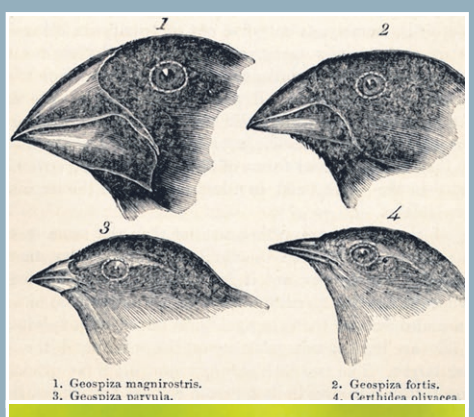
- Evolution refers to the way living things change over time.
- During one of his voyages on the HMS Beagle ship, Darwin visited the Galapagos Islands, an archipelago comprising 13 main islands and many smaller ones.
- He theorised that these species likely migrated from South America to these remote islands in the Galapagos archipelago and, over time, they adapted to the unique environment of each island, and evolved into new species.

Here are four unique types of animal species native to the Galapagos islands:

BIRDS

Finches

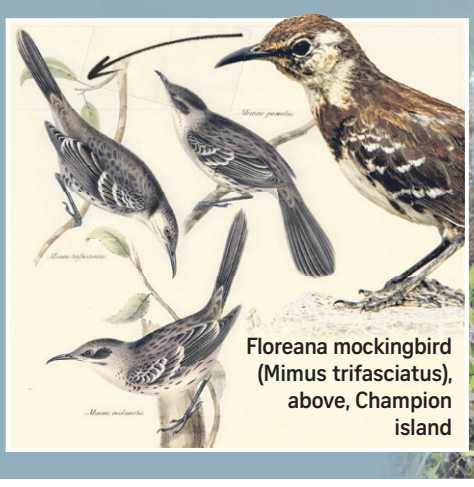
- A diagram of the four beaks (right) has been commonly used in textbooks to show the finches' evolution into different types of species.
- Their different types of beaks are said to be adapted so that they can consume different types of food. For instance, fruit-eating finches have parrot-like beaks, whereas finches that eat insects have narrow beaks.
- Many had the misconception that this sighting helped Darwin explain evolution, but it was in fact British biologist David Lack who discovered this in the 1940s.
- He drew upon Darwin's theory of evolution and named his book Darwin's Finches, which explains the confusion.



Galapagos ground finch (Geospiza fuliginosa), Pinta Island

Mockingbirds

- The three species of mockingbirds that Darwin collected from three different islands in the Galapagos gave him his "eureka" moment.
- He realised that each of the birds, though they belonged to the same genus, Mimus, had variations in their characteristics, such as the birds from each of the islands sporting feathers of a different colour.



Floreana mockingbird (Mimus trifasciatus), above, Champion island

IGUANAS

- There are two types of iguanas in the Galapagos, the land and marine iguanas. Marine iguanas are the only modern lizards that can forage in the sea, and are adapted to survive on scarce food on the islands.
- They are able to scrape algae off rocks, and use their large claws to grip the rocky seafloor.

Male (top) and female Galapagos marine iguanas.

TORTOISE

- The famed Galapagos tortoise, Chelonoidis nigra, is one of the largest tortoises in the world, weighing up to 220kg.
- However, its shell size and shape vary across populations. For instance on islands with dry lowlands, the tortoises are smaller, with "saddleback" shells and long necks, which help them reach for vegetation that grows above ground.

Many subspecies of Galapagos tortoises are now endangered.

SOURCES AND PHOTOS: DARWIN ONLINE, WILLIAM HUXLEY DARWIN, PRIVATE COLLECTORS, RUBEN HELENO, JAMES P. GIBBS, SUNY-ESF, MARTIN WIKELSKI STRAITS TIMES GRAPHICS