a mixture of two already-available generic drugs, it could have been sold fairly cheaply, but it wasn't. "BiDil's only benefit beyond taking the generic drugs in combination was its reduction of the pill burden. BiDil would thus lead to African Americans paying more for the same medication."

In sum, Bliss has produced a first-rate analysis of the production and meaning of genomic data that are often being organized according to the naturalistically reified categories of American political life. Anyone perplexed over the mixed messages about race that have been coming out of genomics these past few years will find *Race Decoded* an important book.

References

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10.1126/science.1226880

Updrafting energy. Cumulonimbus over tropical Africa (Senegal and Mali), 5 February 2008.

CLIMATE

A Head in the Clouds Elucidates

Spencer Hill

Misunderstanding of climate abounds, even among those trained in science—many of the most visible climate change skeptics are physicists and engineers. The Princeton Primers in Climate are intended as an antidote. Each short book in the series, written "for students, researchers, and scientifically minded general readers," offers a concise introduction to a particular facet of the interconnected systems that affect climate. In *Atmosphere, Clouds, and Climate*, the series's fourth title, David Randall covers the atmosphere.

Atmosphere, Clouds, and Climate
by David Randall
Princeton University Press, Princeton, NJ, 2012. 287 pp. $75, £52. ISBN 9780691143743. Paper, $27.95, £19.95. ISBN 9780691143750. Princeton Primers in Climate.

The book focuses on the atmosphere's lowest layer (the troposphere) and the physical processes there that are key to understanding Earth's climate. Randall (Colorado State University) has published extensively on clouds, their representation in climate models, and climate dynamics in general. His account here falls into two distinct, although not formal, sections. The early chapters provide a methodical breakdown of large-scale atmospheric circulation; the back half of the book samples nuances of atmosphere and climate.

Randall starts with the must-know basics: climate versus weather, atmospheric composition and vertical structure, radiative transfer, and a superb back-of-the-envelope demonstration of climate change. These aspects combine to yield a simple conceptual picture of the climate system: The Sun preferentially heats the tropics (in contrast with higher latitudes) and the surface (in contrast with higher altitudes), imbalances that drive atmospheric flows to move energy poleward and upward.

Having covered the why of atmospheric circulation, Randall next addresses the how, explaining in depth the processes involved. He spells out how hot, moist air from the tropical surface rises only within narrow, towering cumulus clouds and quantitatively demonstrates how the height of such "cumulus convection" depends on the amount of energy available. The author goes on to show how these narrow cloudy towers set the conditions for the whole tropics. Other highlights include discussion of how Earth's rotation leads to the mid-latitude jet streams and tropical trade winds and of the role of mid-latitude winter storms in moving energy poleward. In four chapters and a mere 139 pages, Randall provides readers with an impressively thorough conceptual understanding of the atmosphere's central role in climate.

Parts of the remainder of the book wander a bit too far. For example, Randall spends a chapter addressing the limits of the atmosphere's long-term predictability, the point being that while weather is chaotic and thus fundamentally unpredictable, climate change (because it is externally driven) can be reliably forecast. For nonspecialists, the multiple pages detailing the underlying mathematics add little intuitive understanding of the system and are therefore expendable.

But overall, *Atmosphere, Clouds, and Climate* paints a lucid, detailed picture of the atmosphere, explaining both how it works now and how that could change due to human influence. Randall illuminates difficult topics with plain-language explanations, colorful analogies, illustrative plots, and even clever jokes. From now on, when thinking about convectively available potential energy, I will picture a hungry dog devouring its food. His passion consistently shines through, as when describing a thunderstorm as an "awe-inspiring thing of beauty." One gets the sense that Randall really enjoyed writing this primer, which makes for a very pleasant read.

One question facing the book and the entire series is simply whether the intended audience will consume the material. By design, the titles split the difference between accounts for lay readers and hardcore textbooks for climate scientists. Is the middle a Goldilocks zone or a no-man's land? Regardless, anyone who peruses *Atmosphere, Clouds, and Climate* will learn from this enjoyable, information-packed book.

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The reviewer is in the Atmospheric and Oceanic Sciences Program, Princeton University and National Oceanic and Atmospheric Administration Geophysical Fluid Dynamics Laboratory, 201 Forrestal Road, Suite 308B, Princeton, NJ 08540, USA. E-mail: spencerh@princeton.edu