is a satisfaction, on the most restrained and moderate scale, of our "natural" normal and healthy instincts. I still maintain that it is impossible to say whether the production of a family or the reasonable satisfaction of the sexual instinct is more "natural," in that this term merely introduces confusion into the question. There still seems to linger in some quarters the idea that the sexual act is *per se* evil.

In any case, it appears to me to be very dangerous ground for a representative of the Catholic Church to denounce contraception as unnatural while the same Church sanctions what the average man would regard as equally or more unnatural, namely, *coitus reservatus*, as a way out of the difficulty. It also sanctions intercourse during the (so-called) "safe period," which also, if I understand Father Swann, he would call unnatural (provided it were really "safe").¹ In any case, as shown clearly by Dr. Stopes ("Wise Parenthood," p. 55; and "Contraception"), union during this period is for most women definitely "unnatural."

(2) I will not waste space with comment on Father Swann's criticism of my analogy from food, save to say that if we only ate in order to sustain life, the most modest dinner-party would be excessive. And that his remarks on the ancient Romans and the vomitorium are off the point. The moral need for restraint remains whether one practises artificial birth-control or no, and whether one enjoys one's dinner or no. To assume that contraception must mean excess is a mere insult to those who practise it.

(3) As to the individual's concern for salvation, I was merely attempting to show that it could be pushed to too great lengths, which is undoubted. The same authority quoted by Father Swann also made a remark to the effect that those who lost their life should find it. Those who are over-concerned about their individual souls do not "lose themselves" in this way.

J. S. HUXLEY.

October 21.

The Anti-trade Winds.

IN the article published in NATURE of July 18, p. 115, I am glad to see that Mr. L. C. W. Bonacina is in conformity—at least in a general sense—with my views upon the question of the anti-trades. I do not know the opinion of European meteorologists exactly in regard to the *fixity* of these currents; but if we examine books as those of Ferrel, Dove, Angot, etc., it seems that the existence of the anti-trades is a well-recognised fact. The evidence, however, is not clear; on the contrary, the facts seem to be against that theory. I find very much justified the remark of Sir Napier Shaw (Quarterly Journal of the Meteorological Society, January 1925) that he had "never been really able to prove the existence of an anti-trade over the region between anti-cyclones and the equator."

Do the south-west or westerly winds extend over the limits of the equator? I think they do not. Besides the observations of Bogota, those of Pasto in South Colombia (Lat. $1^{\circ} 31' N.$), at the height of 2595 metres, show that the high winds blow from east and south-east.

The directions of the dust of volcanoes are frequently said to prove the existence of the anti-trades. As I wrote in the U.S. *Monthly Weather Review*, December 1923, the volcanoes Cotopaxi at Quito and Colima in Mexico do not prove the existence of such winds.

I know that Mr. Bonacina refers to mean condi-

tions in the use of the terms *trade* and *anti-trade*. I do not see any objection in the use of the *trades*. They blow in the Atlantic quite constantly, but not so the anti-trades. My opinion is that the atmospheric circulation, as developed by Thompson, Ferrel, etc., is not in accord with observed conditions in tropical and equatorial countries.

S. SARASOLA, S.J.

Observatorio Nacional de San Bartolomé,
Bogotá, September 11.

FATHER SARASOLA'S observations are certainly out of harmony with the older ideas about the general circulation of the atmosphere as due to Ferrel, Dove, and others, but these are not nowadays accepted as anything more than a rough approximation, and the observations, in fact, lend most valuable local support to more recent views, according to which over the equatorial limits of the north-east and south-east trades the average direction of the wind is respectively south-east and north-east, becoming south-west and north-west respectively above the polar margins of the trades. A scheme involving this disposition of the anti-trades was, as I indicated in the article in NATURE of July 18, put forth by Blair (*Monthly Weather Review*, 1916), and various upper air observations in different localities certainly support it. In the vicinity of the Cape Verde Islands, lat. $16^{\circ} N.$, the "anti-trade" is, I believe, south-east, in conformity with the observations in Colombia, whereas in the vicinity of the Canary Islands in lat. $28^{\circ} N.$ it becomes south-west. In a report of upper air observations at the Apia Observatory, Samoa ($14^{\circ} S.$), during 1923-24, the anti- or counter-trade is very definitely established above the south-east trade, its base being between the altitudes of three to five miles according to season, the direction being north-east below and changing through north to north-west above.

It may, therefore, be suggested that, corresponding to what happens over the south-east trade in Samoa, the south-westerly wind may yet, with further observations, be found in Colombia above the southeasterly wind found by Father Sarasola overlying the north-east trade—which south-westerly wind would gradually descend with increasing latitude towards the polar margin of the north-east trade. It must, further, not be forgotten that the northern trade system is much upset by the monsoons, being locally subverted in summer, and reinforced in winter, and if the north-east trade is variable locally as regards regularity and other features, it were only to be expected that the counter-trade would be so too. But I fail to see that there is any evidence for doubting the existence of the "anti-trades," at all events, in a statistical sense, and theory surely necessitates some kind of average counter-flow away from the equator to balance the statistical "trades" towards the equator.

Much of the difficulty which appears to exist about "trades," "anti-trades," "westerlies," and other *stereotyped* winds, as items in the general circulation of the atmosphere, undoubtedly turns upon the matter of definition. Any one who tries to frame an exact definition of a "trade," etc., to be applied to the actual currents of the atmosphere will soon discover that "trades," "anti-trades," and so forth, are really statistical abstractions, artificial categories, indispensable in enabling us to form a mental picture of the mean or average structure of the circulation, but a fatal snare the moment we lose sight of the fact that this statistical picture of the circulation represents not a fixed static system, but one in a perpetual state of perturbation—of distortion and subversion

¹ I quote from "The Morality of Birth-Control," by "A Priest of the Church of England," London, 1924.