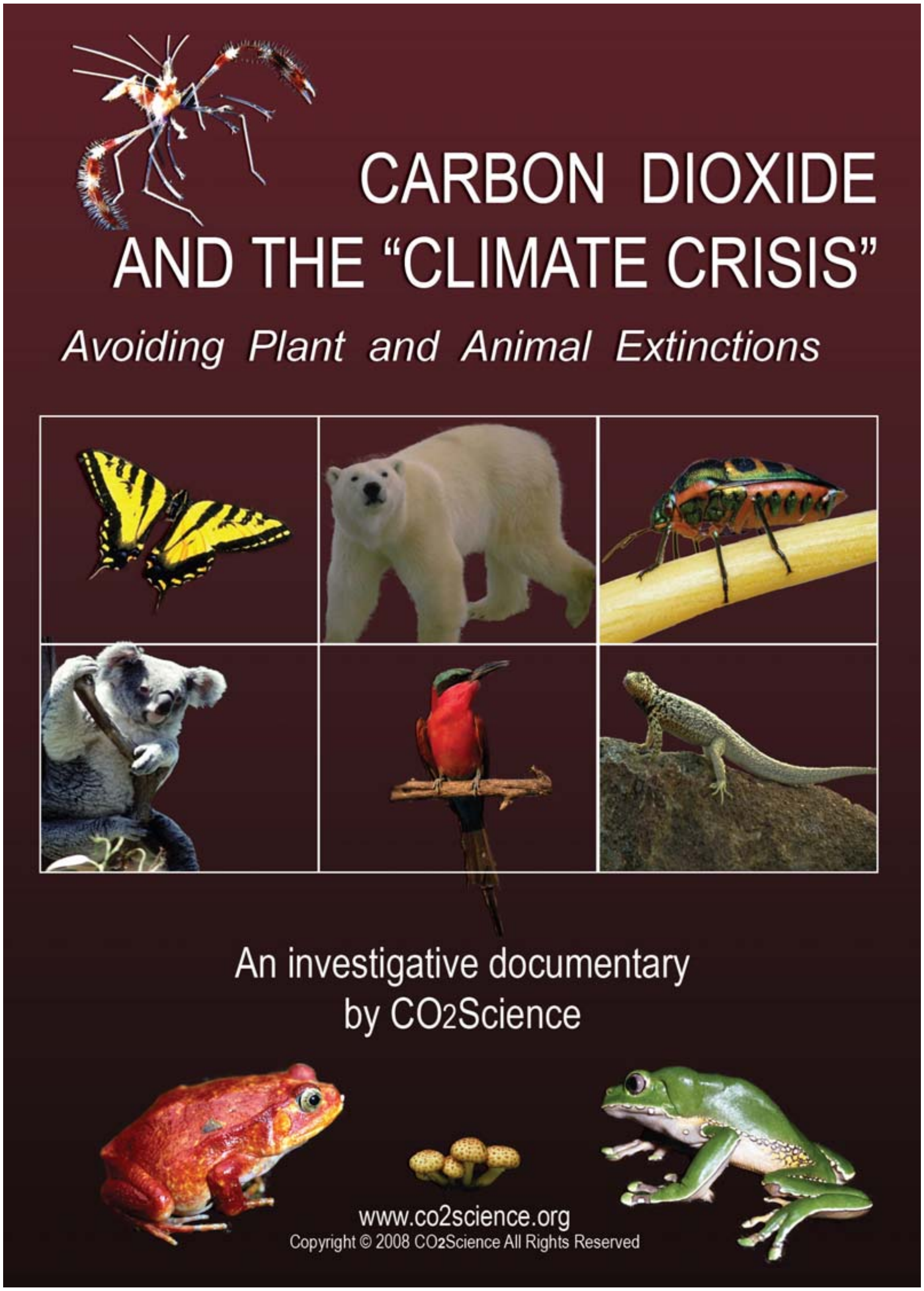
DVD VIDEO TRANSCRIPT WITH PEER-REVIEWED SCIENTIFIC REFERENCES



INTRODUCTION

Craig Idso

Hello. I'm Craig Idso, Chairman of the Center for the Study of Carbon Dioxide and Global Change. In the first installment of our continuing investigative series -- *Carbon Dioxide and the Climate Crisis: Reality or Illusion?* -- we examined a number of claims regarding the potential impacts of earth's rising atmospheric carbon dioxide or CO_2 concentration on the planet's climate, as set forth in a multitude of model-based predictions of people we refer to as *climate alarmists*. These radical environmentalists incessantly insist that humanity's CO_2 emissions must be drastically reduced, in order to avoid a global warming of epic proportions and catastrophic consequences. As we demonstrated in our first production, however, there is absolutely *no observational evidence* that provides any compelling support for these contentions. And in this second production of our series, we do the same with respect to the climate-alarmist claim that increases in the air's temperature and CO_2 concentration will cause unprecedented plant and animal *extinctions*, both on land and in the waters of the world's oceans.

SPECIES EXTINCTIONS

Craig Idso

In an interview published in *Physics Today*,[1] Sir John Houghton -- who is one of the world's foremost climate alarmists -- *declares*, as if it were an *established fact*, that "we are in danger of losing thousands, if not millions, of species because of climate change." And because of his political prominence, and the similar contentions of others like him, this *hypothetical scenario* is frequently cited as if it were an *absolute verity*. The *truth*, however, is that there is precious little real-world *evidence* for what Sir John and the world's climate alarmists claim. In fact, there is an abundance of *counter* evidence, which suggests that the vast majority of the predicted extinctions will *not* occur.

Robert Balling

There are always going to be winners and losers. I mean if you look at the long history of the earth, plants and animals have come and gone, and come and gone, and it's very likely that will continue. But will there be some mass extinction? I can't believe there would be. Every time I hear about some polar bear or about some butterfly or some bird, I always wonder, so how did they survive the eons that they had to survive? I mean these animals, let's face it, have had to live through ice ages, they've lived through a Medieval Warm Period. They had to live through this Younger Dryas period when the temperature of the earth seemed highly unstable. They all made it somehow. And I believe in the future, that they'll make it again, and that the temperature rise we're talking about will undoubtedly impact some ecosystem negatively, but overall I think the evidence is overwhelming that the elevated CO_2 will have positive effects for the biosphere, and that many plants and animals will reap benefits from a slightly warmer world and a place that has more CO_2. So I don't buy into this, all this extinction that's going to occur. It just doesn't seem like the earth would evolve to be so fragile. It strikes me that the earth would evolve and be robust, and that the plants and animals have gone through a lot in the eons they've been here, and they're up to the task of a degree or two of warming that might be in their future.

Fred Michel

And what bothers me in terms of the whole wildlife issue, well, the ecological issue, again I'm not a biologist, but when you look at the proliferation of species and the diversity that we have, it increases when you have warmer temperatures. You can look at it from what kind of ecosystems we have in the Arctic versus what we have in the tropics. The diversity of species is higher in the tropics than it is in the Arctic. Same type of thing when you go from a cold glacial period to a warm interglacial period. So for people to be saying that we're going to lose all these species, we're going to lose our diversification, no; we'll probably have other species filling those niches that are created, and we'll probably end up with a larger diversity of species.

Craig Idso

It is true that many plants and animals *do migrate* as climate changes; but in response to the global warming of the past century and projected *future* warming, another climate-alarmist icon, James Hansen, has presented testimony to a U.S. House of Representatives committee that included the claim that "polar species can be pushed off the planet, as they have no place else to go," and that "life in alpine regions ... is similarly in danger of being pushed off the planet."

This idea *sounds* logical enough, but is there any *evidence* that such things really happen in the real world? Do we know, for example, if any of earth's terrestrial plant and animal life has truly been "pushed off the planet" in response to what climate alarmists typically characterize as the *unprecedented warming of the 20th century*? We begin our study of the subject with a consideration of *terrestrial plants*.

TERRESTRIAL PLANTS

Keith Idso

A team of three researchers investigated this climate-alarmist scenario in July and August of 2003 by resurveying the floristic composition of the uppermost ten meters of ten mountain summits in the Swiss Alps,[2] applying the same methodology used in earlier surveys that were conducted there in 1905[3] and 1985.[4] This analysis covered the bulk of the Little Ice Age-to-Current Warm Period transition; and it revealed that plants of many species had indeed marched up the sides of the mountains, as the earth in general -- and the Swiss Alps in particular -- had warmed. Of even *greater* significance, however, was the *fact* that *not a single mountain-top species* was "pushed off the planet." And as a result of that fact, between 1905 and 1985 the mean number of species observed on the ten mountaintops rose by 86%, while by 2003 it had risen by a whopping 138%, providing, in the words of the researchers who conducted the work, "an enrichment of the overall summit plant diversity."

Sherwood Idso

Another research team of four *different* individuals studied the same phenomenon on *twelve* mountaintops in the Swiss Alps,[5] making complete inventories of vascular plant species that were present there in 2004, while following -- "as accurately as possible," in their words -- the same ascension paths used by other researchers in 1885, 1898, 1912, 1913 and 1958, after which they compared their findings with those of the earlier studies. By these means, they detected upward plant migration rates on the order of several meters per decade, which phenomenon increased vascular plant species richness at the mountains' summits by 11% per decade over the 120-year study period. This finding, in their words, "agrees well with other investigations from the Alps, where similar changes have been detected," and they cited, in this regard, four additional studies.[6-9]

Keith Idso

Another pertinent study was conducted by a researcher who analyzed altitudinal shifts in the ranges of alpine and subalpine plants in the mountains of west-central *Sweden*,[10] where air temperature had risen approximately 1°C over the past hundred years. This work revealed that since the early 20th century, alpine and subalpine plants had migrated upslope by an average of 200 m. Most importantly, it also indicated, according to the scientist who did the work, that "no species have yet become extinct from the highest elevations," which finding was said by the researcher to "converge with observations in other high-mountain regions worldwide," in support of which statement five *more* new studies were cited.[11-15]

Craig Idso

In light of these many *real-world findings*, it should be abundantly clear to everyone that even the highly-hyped warming of the past century -- which climate alarmists claim was *unprecedented* over the past one to two *millennia* -- likely did not "push" any upward-migrating plants "off the planet" at the tops of its mountains. Hence, one of the most highly promoted *hypothetical scenarios* of Gore, Houghton and Hansen is clearly seen to be just that -- a *hypothetical scenario* -- which is simply a scientific euphemism for *unsubstantiated claim*.

But what about terrestrial *animals*? And what about pushing them towards earth's *poles* rather than its mountaintops?

TERRESTRIAL ANIMALS

Sherwood Idso

A good place to begin a review of this subject is a study conducted by a group of thirteen researchers that was published in the British journal *Nature* back in 1999.[16] These scientists analyzed changes in the ranges of non-migratory *butterfly* species over the past century, whose northern boundaries were located in northern Europe and whose southern boundaries were located in southern Europe or northern Africa. This work revealed, as stated by the researchers involved in the study, that "nearly all northward [range] shifts involved extensions at the northern boundary with the southern boundary remaining stable."

Keith Idso
This type of behavior is *precisely* what we would expect to see given the *fact* that increases in atmospheric CO_2 concentration tend to reduce the adverse effects of heat stress in plants and actually induce an upward shift in the temperature at which they function optimally.[17-19] That is to say, plants growing in CO_2-enriched air actually *prefer* warmer temperatures; and this phenomenon tends to counter the impetus for poleward migration at the warm edge of a plant's range, while warming provides an *opportunity* for significant poleward expansion at the cold edge of its range. Thus, it is possible that the observed *increases* in butterfly ranges over the past century of concomitant warming and rising atmospheric CO_2 concentration are related to matching changes in the ranges of the plants upon which the butterflies depend for food and shelter.

Craig Idso
Or … the range expansions could be due to some suite of more complex phenomena, possibly even some direct physiological effects of rising temperature and atmospheric CO_2 concentration on the butterflies themselves. In any event, 20^{th}-century warming in Europe has actually been *beneficial* for the continent's butterflies; for the scientists who conducted the work report that "nearly all northward shifts involved extensions at the northern boundary with the southern boundary remaining stable," so that "most species effectively expanded the size of their range when shifting northwards," which range expansions would clearly *decrease* their chances of extinction in a warming world.

In an analogous study that was also published in the journal *Nature* in 1999, two researchers analyzed the geographical distributions of a number of British *bird* species over a 20-year period of global warming, looking for climate-induced changes in their breeding ranges between 1970 and 1990.[20] Their work revealed that the northern margins of southerly species' breeding ranges shifted northward by an average of 19 km over this period; while the mean location of the southern margins of northerly species' breeding ranges shifted *not at all*, which observations are again indicative of *expanding* ranges and a propensity for birds -- like butterflies -- to become more *resistant* to extinction in a warming world.

Sherwood Idso
Still more support for this concept was provided by a 2004 study of the birds of Finland,[21] which were categorized as either *northerly* (34 species) or *southerly* (116 species). In this analysis the researcher quantified changes in their range margins and distributions from two atlases of breeding birds, one covering the period 1974-79 and one covering the period 1986-89, in an attempt to determine how the two groups of species responded to what he called "the period of the earth's most rapid climate warming in the last 10,000 years." Once again, it was determined that the southerly group of bird species experienced a mean poleward advancement of their northern range boundaries of 18.8 km over the 12-year period of supposedly unprecedented warming. The *southern* range boundaries of the *northerly* species, on the other hand, were essentially unmoved, leading

once again to range *expansions* that should have rendered the Finnish birds *less* subject to extinction than they were before the warming.

Craig Idso
Similar results were also obtained in a study of changes in the northern and southern range boundaries of 37 non-migratory British *dragonfly* and *damselfly* species between the two 10-year periods 1960-70 and 1985-95.[22] In this case, all but two of the 37 species *increased* the sizes of their ranges between the two 10-year periods, with the researchers reporting that "species are shifting northwards faster at their northern range margin than at their southern range margin," and concluding that "this could suggest that species at their southern range margins are less constrained by climate than by other factors," which surely appears to be the case.

Sherwood Idso
In one final land animal study that harkens back to James Hansen's idea of species being "pushed off the planet" by warming at the tops of mountains, three researchers studied four unconnected populations of a small live-bearing *lizard* that lives in peat bogs and heath lands scattered across Europe and Asia, concentrating on a small region near the top of a mountain in southeast France at the southern limit of the species' range.[23] There, from 1984 to 2001, they monitored a number of life-history traits of the populations, including body size, reproductive characteristics and survival rates, during which time local air temperatures rose by approximately 2.2°C. In doing so, they observed that individual body size increased dramatically in all four populations over the 18-year study period in all age classes and, in the words of the researchers, "appeared related to a concomitant increase in temperature experienced during the first month of life." As a result, since fecundity is strongly dependent on female body size, they found that "clutch size and total reproductive output also increased." In addition, they learned that "adult survival was positively related to May temperature."

Keith Idso
In discussing their findings, the French researchers say that since *all fitness components investigated responded positively to the increase in temperature*, "it might be concluded that the common lizard has been advantaged by the shift in temperature." This finding, as they describe it, stands in stark contrast to what they call the "habitat-based prediction that these populations located close to mountain tops on the southern margin of the species range should be unable to cope with the alteration of their habitat." Hence, they conclude that "to achieve a better prediction of a species persistence, one will probably need to combine both habitat and individual-based approaches," noting, however, that *individual responses*, such as those documented in their study (which were all positive), represent "the ultimate driver of a species response to climate change."

Craig Idso
Coming down from the mountaintop and peering into the world's oceans -- where climate alarmists such as Al Gore and James Hansen contend that global warming is causing corals to lose their symbiotic algae and experience deadly *coral bleaching* -- we

investigate *this* phenomenon, as well as *another* extinction scenario that they promote simultaneously.

CORAL REEFS

Craig Idso

For some time now, it has been claimed that the ongoing rise in the atmosphere's CO_2 concentration is raising havoc with earth's corals, as well as numerous other calcifying marine organisms, by *acidifying the world's oceans* and thereby lowering the calcium carbonate saturation state of seawater, which -- climate alarmists claim -- makes it much more difficult for such creatures to produce their calcium carbonate skeletons.[24] However, there is no compelling reason to believe that calcifying marine life will be significantly harmed, much less *destroyed*, by this phenomenon; for the CO_2-induced acidification hypothesis, along with its associated deadly consequences, is based almost *solely* upon *physical-chemical* effects, while it *totally ignores* some important *biological* processes.

So what's the story here? Is there any real-world evidence that can be cited in support of Hansen's and Gore's strident claims? Climate alarmists certainly make it *appear* such is the case; but a little scientific sleuthing reveals nothing of substance in this regard. In fact, it seems to suggest just the *opposite*.

Sherwood Idso

In a study of colonies of *Porites* coral scattered throughout Australia's Great Barrier Reef[25] -- which benefited from additional data obtained from Hawaii[26,27] and Thailand[28] that significantly extended the sea surface temperature range investigated -- calcification rates were found to be linearly related to temperature, with a 1°C increase in average annual sea surface temperature actually *increasing* average annual calcification rate by 0.33 g per cm^2 per year.

Craig Idso

Noting that their results allowed them to make an "assessment of possible impacts of global climate change on coral reef ecosystems," the pair of researchers who conducted the work determined that between the two 50-year periods 1880 through 1929 and 1930 through 1979, there was an approximate 4% *increase* in calcification rate, which result is radically different from the 6-14% *decrease* suggested to result from CO_2-induced ocean acidification by a study based primarily upon *theoretical calculations*,[29] as opposed to the host of *real-world observations* acquired from Australia, Hawaii and Thailand.

Sherwood Idso

Even *more* stunning was the two researchers' discovery that between the two 20-year periods 1903 through 1922 and 1979 through 1998, the warming-induced *increase* in coral calcification was about *12%* in the *central* Great Barrier Reef, about *20%* in the *southern* Great Barrier Reef, and as much as *50%* to the *south* of the Great Barrier Reef.

In light of these actual calcification rate *measurements*, therefore, and in stark contrast to the mere *contentions* of Al Gore and James Hansen, the two researchers concluded that coral calcification rates "may have already significantly increased along the Great Barrier Reef in response to global climate change."

Keith Idso
Two other scientists investigated the subject using data obtained from a massive *Porites* coral on the French Polynesian island of Moorea.[30] This effort indicated that a 1°C increase in water temperature increased coral calcification rate by 4.5%, leading the pair of scientists to similarly state that "instead of a 6-14% decline in calcification over the past 100 years, calcification has increased."

Sherwood Idso
At about the same time, yet *another* scientist[31] developed a relationship between coral calcification rate and annual average sea surface temperature, based on data collected from colonies of a different reef-building coral at twelve locations in the Gulf of Mexico and the Caribbean Sea. This work revealed that the mean calcification rate in the Gulf of Mexico rose by 0.55 g per cm^2 per year for each 1°C temperature increase, while in the Caribbean Sea it rose by 0.58 g per cm^2 per year, which result was nearly *twice as great* as that obtained in the original *Porites* study we discussed. Finally, after pooling these data with data obtained from still other species of coral living off the coasts of Belize,[32] the U.S. Virgin Islands,[33] and the Netherlands Antilles,[34] an all-inclusive relationship of about 0.5 g of calcification per cm^2 per year for each 1°C increase in annual average sea surface temperature was obtained.

Craig Idso
To these papers we could add many others[35-40] that *also* depict increasing rates of coral calcification in the face of rising temperatures and atmospheric CO_2 concentrations. As for *why* this is the way earth's corals respond, one research group[41] has said that "observed increases in coral reef calcification with ocean warming are most likely due to an enhancement in coral metabolism and/or increases in photosynthetic rates of their symbiotic algae," as we have consistently stated on our website when noting, over and over, that coral calcification is a *biologically-driven* process that can overcome physical-chemical limitations, which in the *absence of life* would appear to be insurmountable.

Sherwood Idso
One more reason for not believing the ongoing rise in the air's CO_2 content will lead to reduced oceanic pH in the vicinity of the world's coral reefs and thereby lower their calcification rates, is that the same phenomenon that powers the twin processes of coral calcification and phytoplanktonic growth -- namely, *photosynthesis* -- tends to *increase* the pH of marine waters.[42-47] And this phenomenon has been shown to have the ability to dramatically increase the pH of the world's marine bays, lagoons and tidal pools,[42,43,46,47] as well as significantly enhance the surface-water pH of oceanic areas as large as the North Sea.[44]

Craig Idso
In one additional study devoted to corals that involves a much longer period of time than all of the others we have discussed, another research team[48] determined the original growth rates of long-dead Quaternary corals found in limestone deposits of islands in the Wakatobi Marine National Park of Indonesia, after which they compared them to the growth rates of present-day corals of the same genera living in the same area.

Keith Idso
Their work revealed that the Quaternary corals grew "in a comparable environment to modern reefs" -- except, of course, for the air's CO_2 concentration, which is currently higher than it has been at any other time throughout the entire Quaternary, which spans the past 1.8 million years. Most interestingly, their measurements indicated that the radial growth rates of the modern corals were 31% *greater* than those of their ancient predecessors in the case of *Porites* species, and *34%* greater in the case of *Favites* species.

Craig Idso
Clearly, the *net impact* of 20th-century increases in atmospheric CO_2 and temperature has not been anywhere near as catastrophically disruptive to earth's corals as climate-alarmist dogma suggests it should have been. Quite to the contrary, the temperature and CO_2 increases appear to not have been hurtful *at all*. In fact, they actually appear to have been *helpful*. But what about *other* calcifying marine organisms? Have they been harmed in any way?

OTHER CALCIFYING SEA LIFE

Sherwood Idso
Some insight into this subject was recently provided by an international team of thirteen researchers,[49] who bubbled air of a number of different atmospheric CO_2 concentrations through culture media containing the phytoplanktonic coccolithophore species *Emiliania hyxleyi*, while determining the amounts of particulate organic and inorganic carbon they produced. In addition, they determined the real-world change in average coccolithophore mass over the past 220 years in the subpolar North Atlantic Ocean, based on data obtained from a sediment core, over which period of time the atmosphere's CO_2 concentration rose by approximately 90 ppm and the earth emerged from the frigid depths of the Little Ice Age to experience the supposedly unprecedented high temperatures of the Current Warm Period. So what did they find?

Craig Idso
What they found was an approximate *doubling* of both particulate organic and inorganic carbon between the culture media in equilibrium with air of today's CO_2 concentration and the culture media in equilibrium with air of 750 ppm CO_2. In addition, they say the field evidence they obtained from the deep-ocean sediment core they studied "is

consistent with these laboratory conclusions," and that it indicates that "over the past 220 years there has been a 40% increase in average coccolith mass."

Sherwood Idso
Focusing more on the *future*, a second independent team of seven scientists[50] studied *Emiliania huxleyi* coccoliths that they isolated from the Sargasso Sea, and which they grew in semi-continuous culture media at low and high light intensities, low and high temperatures (20 and 24°C), and low and high CO_2 concentrations (375 and 750 ppm). This work revealed that in the *low-light* environment, the maximum photosynthetic rate was lowest in the low-temperature, low-CO_2 or *ambient* treatment, but was increased by 55% by *elevated temperature alone* and by 95% by *elevated CO_2 alone*, while in the high-temperature, high-CO_2 or *greenhouse* treatment it was increased by 150% relative to the *ambient* treatment.

Keith Idso
Likewise, in the *high-light* environment, there were maximum photosynthetic rate increases of 58%, 67% and 92% for the *elevated temperature alone*, *elevated CO_2 alone* and *greenhouse* treatments, respectively. Consequently, the researchers concluded, in their words, that "future trends of CO_2 enrichment, sea-surface warming and exposure to higher mean irradiances from intensified stratification will have a large influence on the growth of *Emiliania huxleyi*." And, of course, that "large influence" will be *positive*, and tremendously so.

Craig Idso
Clearly, climate-alarmist claims of impending species extinctions due to increases in both temperature and atmospheric CO_2 concentration are not only *not supported* by real-world evidence, they are actually *refuted* by it. But there is one additional phenomenon that we need to discuss that may also play a vital role in how life on earth would likely respond to any rapid increase in temperature that might possibly occur in the future for *whatever* reason, and that is the phenomenon of *rapid evolutionary change* – the ability of plants and animals to actually evolve in response to dramatic shifts in climate.

RAPID EVOLUTIONARY CHANGE

Sherwood Idso
One example of rapid evolutionary change is illustrated in a paper published in 2007 by a group of scientists[51] from the United States, Canada and Australia, who critiqued the so-called *climate-envelope approach* to predicting extinctions -- which is highly regarded by Al Gore and James Hansen -- citing as their primary reason for doing so the fact that this approach "implicitly assumes that species cannot evolve in response to changing climate." But, as they correctly point out, "many examples of contemporary evolution in response to climate change exist," such as populations of a frog they had studied that had "undergone localized evolution in thermal tolerance,[52] temperature-specific development rate,[53] and thermal preference,[54]" *in less than 40 years*. Similarly, they report that

"laboratory studies of insects show that thermal tolerance can change markedly after as few as 10 generations.[55]"

Craig Idso

Adding that "studies of microevolution in plants show substantial trait evolution in response to climate manipulations,[56]" the researchers further noted that "collectively, these findings show that genetic variation for traits related to thermal performance is common and evolutionary response to changing climate has been the typical finding in experimental and observational studies.[57,58]"

Sherwood Idso

Although evolution will obviously be slower in the cases of long-lived trees and large mammals, where long generation times are the norm, the scientists say that the case for rapid evolutionary responses among many other species "has grown much stronger," citing, in this regard, the work of six other groups of researchers comprised of two dozen different individuals.[59-64] As a result, they write that "on the basis of the present knowledge of genetic variation in performance traits and species' capacity for evolutionary response, it can be concluded that evolutionary change will often occur concomitantly with changes in climate as well as other environmental changes.[59,65-68]"

Keith Idso

Much the same conclusion has been reached by still other groups of scientists. In a study of the field mustard plant that was also published in 2007, for example, a group of three researchers[69] found evidence for what they describe as "a rapid, adaptive evolutionary shift in flowering phenology after a climatic fluctuation," which finding, in their words, "adds to the growing evidence that evolution is not always a slow, gradual process but can occur on contemporary time scales in natural populations."

Sherwood Idso

Likewise, another group of researchers who published in 2007[70] -- who worked with hybrids of two *Populus* tree species -- obtained results which, as they phrased it, "quantify and identify genetic variation in response to elevated CO_2 and provide an insight into genomic response to the changing environment." In regard to these findings, they wrote that they "should lead to an understanding of microevolutionary response to elevated CO_2 ... and aid future plant breeding and selection," noting that various research groups have already identified numerous genes that appear sensitive to elevated CO_2.[71-74]

Keith Idso

Life in the sea, in this regard, is no different from life on land. In another study published in 2007, for example, a team of four marine biologists[75] conducted an experiment with a species of zooplankton in which they say they "were able to demonstrate a rapid microevolutionary response (within 1 year) in survival, age at reproduction and offspring number to elevated temperatures," and they state that "these responses may allow the species to maintain itself under the forecasted global warming scenarios," noting that what they learned "strongly indicates rapid microevolution of the ability to cope with higher temperatures." And, of course, other studies have produced analogous results with respect to increases in temperature on corals[76,77] and increases in CO_2 on freshwater microalgae.[78]

CONCLUSION

Craig Idso

Climate alarmists *claim* that as the world warms in response to the ongoing rise in the air's CO_2 content, many plant and animal species will be driven to extinction because they will not be able to migrate either poleward in latitude or upward in elevation fast enough to escape the stress imposed by the rising temperatures. Real-world *observations*, on the other hand, suggest just the *opposite*.

With respect to plants, as long as the atmosphere's CO_2 concentration rises in tandem with its temperature, most of them will not "feel the heat," as their physiology will change in ways that make them better adapted to warmer conditions. Hence, although earth's plants will likely spread poleward in latitude and upward in elevation at the cold-limited boundaries of their ranges in response to a warming-induced opportunity to do so, their heat-limited boundaries will probably remain pretty much as they are now or shift only slightly. Consequently, in a world of rising atmospheric CO_2 concentration, the ranges of most of earth's plants will likely *expand* if the planet continues to warm, making terrestrial plant extinctions even *less* likely than they are currently.

As for land animals, they appear to react in much the same way. In response to increases in atmospheric temperature and CO_2 concentration, they tend to migrate poleward and upward, where cold temperatures prevented them from going in the past, as they follow earth's plants, while the heat-limited boundaries of their ranges are often little affected, allowing them to also expand their ranges.

With respect to marine life -- and especially that of calcifying organisms such as corals and coccolithophores -- neither increases in *temperature*, nor increases in atmospheric *CO_2 concentration*, nor increases in both of them *together*, have had any ill effects on the important processes of calcification and growth. In fact, out in the real world of nature, these processes have actually responded *positively* to the supposedly unprecedented concomitant increases in these "twin evils" of the radical environmentalist movement.

So where does all of this information leave us? On the one hand, a goodly portion of earth's plants and animals should actually *expand* their ranges and gain a *stronger* foothold on the planet, as the atmosphere's temperature and CO_2 concentration continue to rise. On the other hand, if the air's CO_2 content were suddenly to *stop* increasing, the biosphere could find itself facing a significant challenge, as the world's plants would cease acquiring the extra physiological protection against heat stress that is afforded them by rising atmospheric CO_2 concentrations. Consequently, the end result of curtailing mankind's CO_2 emissions might well be just the *opposite* of what many people are hoping to accomplish by encouraging that policy; and many species of plants and animals might actually be *driven* to extinction, rather than being *saved* from such a fate. We have got to realize that rising atmospheric CO_2 concentrations are *not* the *bane of the biosphere*, but a *boon* to the planet's many lifeforms.

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