(一) “臭氧保护重要图表（ozonell_updt）”（来自大气化学的赵老师）

本文主要讲了臭氧的减少是由于什么引起的，对动植物甚至生态圈的不利影响；以及蒙特利尔协议的成功之处。

(二) “ozone”&“ozone-story”&“大气化学：原因与影响”

前两个是通过漫画和文字的方式轻松展示了臭氧的减少的不利；后一篇文献具体用文字和数据陈述了这个事实。

1.臭氧发展史

1) 1928, CFCs was invented. (non-toxic, non-corrosive, non-flammable, versatile, long life wonder gases.)
2) 1977, the United Nations Environment Program(UNEP) sets up a co-ordinating committee to study the ozone layer.
3) 1978, the United States of America, Canada, Sweden and Norway ban the use of CFCs in aerosols.
4) 1981, UNEP starts inter-governmental negotiations to protect the ozone layer.
5) After 1982, in the absence of other moves, the consumption of CFCs increases again. Industry demands proof of ozone depletion due to CFCs.
6) 1985, ozone depletion!
7) 1987, 46 governments agreed to a fifty percent cut in the production and consumption of CFCs by the year 2000; s freeze in production and consumption of halons by 1992; further controls linked to assessments by experts.
8) 1988, the UNEP-WMO report on ozone trends links CFCs to ozone depletion.

Group meeting

2.臭氧的减少对动植物、生态环境的影响

a.动植物——食品来源

1）哺乳动物患上癌症（皮毛保护的动物鼻口、爪子周围的皮肤更易受到辐射的伤害）。
2）粮食作物产量的下降（大米、大豆和高粱）——紫外线照射的加强使叶片表面积减小，进而损害生长。
3）水生野生动植物——浮游生物的繁殖和生长受到了太阳中波紫外线辐射的限制，进而使依赖于浮游生物生存的动植物繁殖和生长受到影响；随着水体上层有机物的减少，紫外线辐射可以穿透进入水体更深的地方，影响生活在哪里的更复杂的植物和动物。

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2.臭氧的减少对动植物、生态环境的影响

EFFECTS OF ENHANCED UV-B RADIATIONS ON CROPS

Possible changes in plant characteristics	Consequences	Selected sensitive crops
■ Reduced **photosynthesis** ■ Reduced **water-use efficiency** ■ Enhanced **drought stress sensitivity** ■ Reduced **leaf area** ■ Reduced **leaf conductance** ■ Modified **flowering** (either inhibited or stimulated) ■ Reduced **dry matter production**	Enhanced plant fragility Growth limitation Yield reduction	Rice Oats Sorghum Soybeans Beans

NB. Summary conclusions from artificial-exposure studies.
Source: modified from Krupa and Kickert (1989) by Runeckles and Krupa (1994) in: Fakhri Bazzaz, Wim Sombroek, *Global Climate Change and Agricultural Production*, FAO, Rome,1996.

表2.1 UV-B对粮食作物的影响

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2.臭氧的减少对动植物、生态环境的影响

b.人类健康

1）皮肤——直接影响（灼伤、慢性皮肤损害/光老化、皮肤癌的风险增加）和间接影响（中波紫外线辐射会损害某些作为抵制疾病载体入侵保护盾的细胞，即削弱免疫系统/艾滋病患者）
2）眼睛——对晶状体的破坏（白内障、雪盲症）

Group meeting

2.臭氧的减少对动植物、生态环境的影响

b.人类健康——皮肤

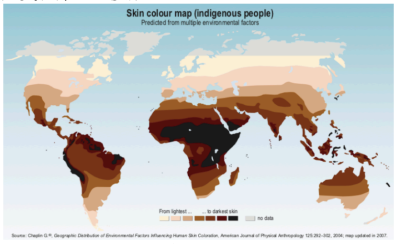

图2.1 全球皮肤颜色分布

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2.臭氧的减少对动植物、生态环境的影响

b.人类健康——皮肤

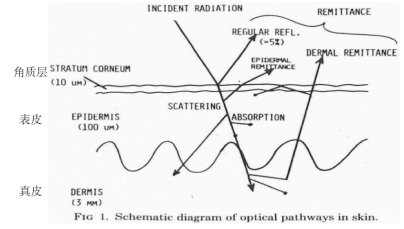

FIG 1. Schematic diagram of optical pathways in skin.

图2.2 皮肤光学路径示意图

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2.臭氧的减少对动植物、生态环境的影响

b.人类健康——皮肤

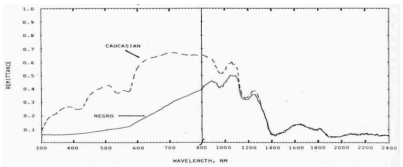

FIG 5. Spectral remittance of dark Negro and fair Caucasian skin (flexor surface of forearm in each case). The lack of significant absorption by melanin for wavelengths longer than approximately 1,100 nm, and increased absorption at shorter wavelengths, is apparent. Note also that, because of regular reflectance at the skin surface, remittance is never less than 5% in either case.

图2.3 白皮肤和黑皮肤对不同波长的光的反射效果

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2.臭氧的减少对动植物、生态环境的影响

b.人类健康——皮肤

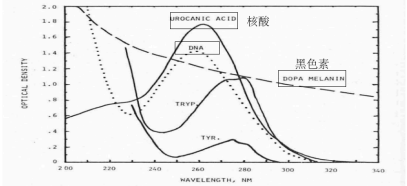

FIG 4. UV absorption spectra of major epidermal chromophores. DOPA-melanin, 1.5 mg% in H_2O; urocanic acid, 10^{-4} M in H_2O; calf thymus DNA, 10 mg% in H_2O (pH 4.6); tryptophane, 2×10^{-4} M (pH 7); tyrosine, 2×10^{-4} M (pH 7). The broad epidermal absorption band near 275 nm is the result of absorption by protein, urocanic acid, nucleic acids, and other aromatic chromphores.

图2.4 不同物质的吸收光谱

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2.臭氧的减少对动植物、生态环境的影响

非洲人或者美洲人的黑色素体呈颗粒状分散开，而白人的呈束状聚集，黄种人介于两者之间。

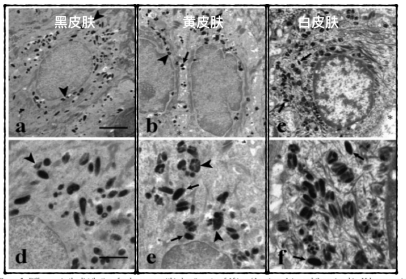

Figure 1. Differences in the distribution of melanosomes within keratinocytes of African/American, Asian and Caucasian skin. Melanosomes in dark skin from an African/American (a,d) are predominantly distributed individually, with a few as membrane-bound clusters (arrowheads) throughout the cytoplasm of epidermal keratinocytes. Melanosomes in light skin from a Caucasian (c,f) are distributed as membrane-bound clusters with a few as individuals (arrows). Melanosomes in Asian skin (b,e) showed a combination of individual (arrows) and clustered (arrowheads) distribution pattern intermediate between the African/American and Caucasian skin. Melanosomes in all types of skin frequently aggregated apically over the nucleus. (a–c) Low magnification; (d–f) higher magnification. Bars: (a–c) 5·2 μm; (d–f) 2·0 μm.

图2.5 黑皮肤、黄皮肤、白皮肤黑色素形状

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2.臭氧的减少对动植物、生态环境的影响

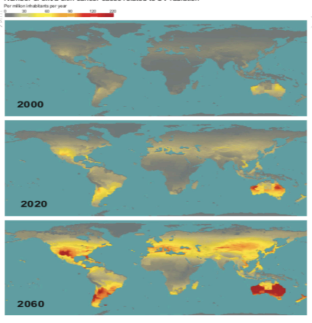

图2.6 与紫外线辐射有关的额外皮肤癌症病例数

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