

阅读空间 · 英汉双语主题阅读

极限科学

Extreme Science



中国教育学会
外语教学
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CENTURY
ORIENTAL 世纪东方

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Contents 目录

- 2 **Editor's Message** 编辑手记
- 4 **Science on the Edge** 边缘地带科学探索
- 9 **Getting the Picture** 摄影术
- 15 **Handling Crocodiles: Some "Tails" from the Tropics**
与鳄鱼“亲密接触”：热带探险传奇
- 19 **Croc Morsels** 莫雷利特鳄
- 21 **Get Started Today!** 从今天开始!
- 22 **You Don't Really Know a Glacier ...
Until You've Lived Under One**
不曾在冰川下住过，你就不会真正了解冰川
- 26 **Spider-Man and Extreme Science: A Web of Connections?**
蜘蛛侠和极限科学：一张紧密联结的网?
- 31 **Survivors Extraordinaire!** 了不起的幸存者!
- 35 **I, Robot — Frontier Scientist**
我，机器人——前线科学家
- 41 **Partners or Rivals?** 伙伴还是对手?
- 42 **Engineers Taking It to the Extreme!** 极限工程师!
- 48 **Possibility Is Everywhere. . . Even in Poisonous Snails!**
随处都有可能，即使是在毒蜗牛身上
- 52 **Teacher's Guide & Activity** 教师指导与活动

“极限”(extreme)似乎成为当今最时尚的词语,从极限运动(extreme sports)到极限品味(extreme taste),人们喜欢刺激和高阶动作。然而,你能否给科学做出一个准确的界定,从而体现人们希望的科学所具有的程度呢?忘掉这事儿吧!长久以来,这一直是努力发展极限科学的科学家们希望解决的问题。不过他们这么做,不仅仅是为了满足自身的愿望。这些科学超人们坚持不懈地探索拓展世界的极限,是为了获得足够的知识,从而改善整个人类的生活。极限科学家们都是工作严谨认真的探险者。极限科学确实非常刺激。



Science

on the

Edge

边缘地带

by Stephen James O'Meara

科学探索

I've walked across a volcano's hot lava flow. Do you think I'm reckless, maybe even crazy?

Before you answer, let me ask you a question: If I offered you \$5,000 — or, say, a full year without homework — would you dare to do it?

If you answer yes, your decision is crazy.

I know, as best anyone can know, how to walk across a lava flow. I am a researcher who has traveled the globe over the last quartercentury to study and document erupting volcanoes. But even with that experience, I still wouldn't walk across just any active lava flow. There are limits, and you have to know them. And that knowledge comes with time and experience. Walking across hot lava is definitely dangerous. One wrong step could mean severe injury or death. So, just because I know how to walk across a field of flowing lava, doesn't mean I'd do it on a dare. . . ever.

I'm an extreme scientist. This means that when I put myself in danger, there is a very good reason — to advance science or human understanding. There are other justifiable reasons.

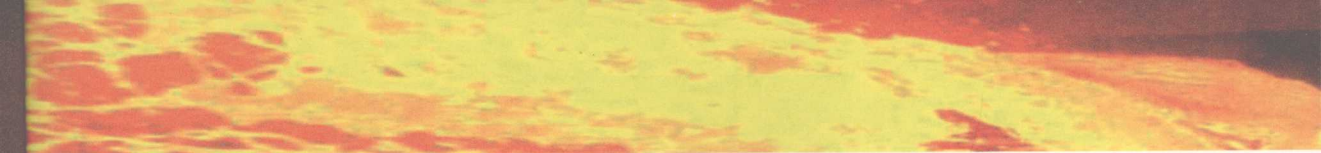
我曾经走过热浪滚滚的熔岩流。你是否觉得我过于鲁莽，或者甚至可能属于疯狂？

你给出答案之前，我先问你一个问题：要是给你 5000 元，或者答应一年不给你布置家庭作业，你敢不敢这么做？

如果，你回答“敢”的话，你才是真的疯了。

我懂得怎样顺利穿过一股熔岩流，对此，大概人人都渴望知道吧！作为一名研究员，在过去的 25 年，为了研究喷发的火山，我曾走遍世界各地。然而，即使拥有这方面的经验，我也还不会穿过任何流动的熔岩流。因为存在着极限，你必须对此有深刻的了解。然而，这些知识需要时间和经验的积累。穿过高温熔岩流无疑是件危险性极高的活动。走错一步，就可能使你遭受伤害，甚至死亡。因此，仅仅知道如何穿过一片流动的熔岩，并非意味着我会贸然这么穿行的。

我是位极限科学家。这就是说，每次我自深入危险境地的时候，都有这样一个崇高的理由：发展科学，提高人类的理解力。当然，还存在其他一些正当的理由。例如，1982 年，在研究夏威夷基劳威亚火山的喷发时，一次



For example, while studying an eruption of Hawaii's Kilauea volcano in 1982, I had to walk (and leap) across flowing lava to save my life. It was the first time I had experienced flowing lava in the field, and I was caught off guard. I was trapped on the edge of a 15-foot-high cliff between two lava flows, with a pool of molten rock beneath me. The only way to escape was to look for places where the surface of the lava had cooled long enough to support my weight. In these places, less than an inch of cooling rock would separate me from the roughly 1,000 degree F lava below.

How did I know where to walk? Before the eruption, I had been “educated” — a native Hawaiian who had walked across hot lava many times had cautiously explained what to do and what not to do. I also had gained experience by experimenting with walking on hot lava before I found myself in this predicament. It takes serious education to do extreme science. And education

为了保住性命，我不得不跳跃穿行流动着的熔岩。这是我在从事该领域研究以来，首次在野外体验熔岩流。我对此没有任何准备。当时，我被困在两个熔岩流之间的15英尺高的悬崖边，我的身下就是沸腾的岩浆池。惟一的逃脱办法就是寻找那些熔岩流表层已经冷却的地方，足可以支撑我身体的重量。在这些地方，不足一英寸厚的冷却熔岩下面，就是高达1000华氏度左右的岩浆。

我是怎么知道穿行路线的呢？火山喷发之前，我曾接受过这方面的“教育”：一位曾多次穿行沸腾熔岩的夏威夷本土人士曾谨慎地向我讲述该做什么，不该做什么。在此之前，我本人行走热熔岩的试验也为这次遇险提供了经验。从事极限科学研究必须接受严密谨慎的学习。这类教育指的是教科书里的知识



Everything about extreme science is serious stuff. It's about risks and the people who take them.

for this kind of work means textbook knowledge and field experience. Becoming proficient in both requires patience, hard work, and practice.

SCIENTISTS TAKING IT TO THE EXTREME

Everything about extreme science is serious stuff. It's about risks and the people who take them. It's about courage and responsibility. And it's about belief — in acquired knowledge and in your inner self. Extreme scientists go a step beyond the requirements of traditional science. They walk a

和实地经验两方面。从事极限科学研究，必须具有足够的耐心、刻苦钻研和丰富的实践。

推动科学极限化的科学家

极限科学是非常严肃的科学。它是研究风险和风险所波及的人员的，它关系到勇气和责任。它是一种信念——一种对已获知识和自我的信任。极限科学家要从传统科学要求的范围向外迈出去一步。他们行走在一条纤细的分界线上，这条线就在伟大的潜在能力与某些人可能会认为是丧失理智的发疯行为之间。为什么神智健全的人要生活在冰川下？为什么神智清醒

fine line between the potential for greatness and what some might say is madness. Why would anyone sane live under a glacier? Why would anyone sane get in the water with a crocodile? Why would anyone sane stand on the lip of an erupting volcano, dodging football-size lava rocks falling from the air, just to collect a sample? The reason is the pursuit of knowledge. . . of truth.

In one branch of my research, for example, my wife, Donna, and I have been investigating whether the pull of the Moon's gravity on Earth affects volcanic eruptions. The theory is that during times of high tidal stress on erupting volcanoes, larger-than-normal eruptions or more-frequent eruptions can occur. The investigation, which began in earnest in the early 1990s, continues to this day. It requires traveling the globe with team members to watch how different volcanoes erupt. If a correlation between lunar tides and volcanic eruptions exists, the knowledge — when used in concert with other established monitoring methods — could help us better predict when an erupting volcano is likely to be a hazardous event. That will save countless lives of those living near the eruption.

Extreme scientists are on a mission. They have spent years studying some aspect of nature — to the point that the only way to gain more answers is to go out on a limb — literally and scientifically. Many extreme scientists challenge long-held beliefs. They introduce new and controversial ideas. They are pioneers, braving the unknown to investigate the unknown, to do what no one has done before — to take science to new frontiers.

THE CHALLENGE — NOT THE DARE

Extreme scientists challenge themselves by putting their schoolbook knowledge to the test. For example, you can read every book and take every course about volcanoes.

的人要和鳄鱼一起呆在水里？为什么神智正常的人为了收集样本，冒着从天而降的足球般大小的熔岩而站到正在喷发的火山口边缘？这么做的原因就是对知识的追求，对真理的追求。

例如我的研究项目的一个分支是，我和妻子当娜一直在研究月球对地球的引力是否影响到火山的喷发。我们的理论是，每当高潮汐应力作用于正在喷发的火山时，比平常更猛烈的火山喷发或更频繁的喷发就会发生。从20世纪90年代初一直到现在，我们都在全心全意地考察这个问题。这一研究需要研究组的成员走遍世界各地，观看不同的火山是如何喷发的。如果太阴潮（lunar tide：纯指受月球影响的潮汐——译者注）与火山喷发真的存在着关联，那么这项研究成果——在与其他业已使用的监测手段共同使用时——就能够帮助人们更准确地预测爆发的火山何时可能会成为一场巨大的灾难，从而挽救居住在火山爆发地附近的无数生灵。



极限科学家肩负着使命。他们多年来致力于研究大自然的某一方面，甚至于为获取更多答案的惟一办法就是让自己陷于孤立无援的险境。许多极限科学家挑战了人们长久以来持有的观念。他们提出了全新而又引起争议的想法。他们是探索者，敢于面向未知领域、研究未知领域，勇于从事前人不曾尝试的做法，将科学带入一个又一个新的前沿。

You can study their physics and create theories about them. But you never will know a volcano unless you watch one erupt (at a safe distance) and face the possible danger.

Two of the greatest extreme scientists in the field of volcanology were Maurice and Katia Krafft of France. For more than 20 years, they risked their lives studying and filming the world's most dangerous volcanoes. They authored many books and five films. They also assembled the largest library on volcanology in the world. Despite

挑战——并非挑衅

极限科学家通过试验课本中学到的知识来挑战自我。例如，你可以阅读关于火山的每本书，聆听关于火山的每门课程。你可以研究火山物理学，提出关于这一领域的新理论。但是，如果你不曾亲眼目睹火山喷发（在安全的距离），不曾直面可能的险境，你就永远不会真正了解火山。



Extreme scientists challenge themselves by putting their schoolbook knowledge to the test.

their great knowledge, the husband and wife team perished in 1991 during a volcanic eruption at Mount Unzen in Japan. Ironically, just after their deaths, one of their videos on volcano safety was used in the Philippines to educate school children about the imminent dangers of a volcano that had just erupted there. The Kraffts' deaths also served to educate today's volcano researchers about the hazards of their work. It set yet another limit on what is wise to do in volcanic research. It's not that the Kraffts did something "reckless" — they just fell prey to the unknown.

THE REWARDS

Where would we be if no one tried to find out what lies beyond what we already know? How do we know what the limits of research are until we've probed them? How do we know what extreme conditions the human body can endure unless we endure them? Where would we be if the unknown always frightened us?

火山学领域两位杰出的极限科学家——法国的莫里斯·卡夫特和卡迪娅·卡夫特，20多年当中冒着生命危险研究并拍摄了世界上最危险的一些火山。他们撰写了许多本专著，拍摄了五部影片。此外，他们组建了世界上规模最大的火山学图书馆。尽管他们对火山具有充分的了解，1991年，这对夫妇不幸在日本的云仙岳火山爆发时遇难。具有讽刺意味的是，在他们刚刚去世后，菲律宾用这对夫妇录制的一部火山爆发安全措施的录像来教育学校的儿童，指出在那里刚刚爆发的火山眼下所呈现的危险。卡夫特夫妇的遇难同样提醒火山研究者，他们所从事的研究具有巨大的危险性。这个教训同样从反面界定了火山研究中哪些才是明智之举。卡夫特夫妇的死不是因为他们做事情“鲁莽”，而是不巧成了未知王国的牺牲品。

回报

如果没有人努力去发现人类已知背后所隐含的未知的話，世界将会变成什么样子？如果我们不去探究，我们如何知道研究的极限是什么？如果我们不去体验，如何知道人体所能承

If Benjamin Franklin had been afraid to experiment with lightning, we might still be reading by candlelight. Franklin suspected that lightning was an electrical current in nature. He was curious to see if he was right. Franklin knew that lightning was not only powerful but also dangerous; still, he flew his kite with the metal key. The results of his experiment paved the way for electricity to benefit humankind. A spinoff was the lightning rod — a means to protect people, buildings, and ships from lightning.

Where would we be if Marie Curie had been afraid to experiment with radioactivity? Anyone who has ever had an X-ray benefits from her work. Yet Curie died from a disease brought on by exposure to the high level of radiation involved in her research. Her own words

explain why she went ahead anyway: “Nothing in life is to be feared. It is only to be understood.”

Extreme science is about adventure, discovery, and knowledge. It's about love and sacrifice. It's about leaving a legacy that will touch the future. Extreme scientists, like firefighters, are heroes, not because they do dangerous things, but because they put fear aside and do what they believe is right and just.

“If you would not be forgotten, as soon as you are dead and rotten,” Benjamin Franklin quipped, “either write things worth reading, or do things worth the writing.” Franklin did both. And maybe someday you will, too.

Be cautious always, but never afraid.



受的极限是什么？如果未知总是把我们吓倒，我们将只能发展到什么地步？

如果本杰明·富兰克林不敢从事闪电方面的试验，我们很可能仍在秉烛读书呢！富兰克林猜想闪电是自然界中的一股电流。怀着强烈的好奇心，他想要验证自己的想法。富兰克林知道闪电不仅具有强大的威力而且十分危险；可是，他仍然用拴上了金属钥匙的风筝。他的实验结果为造福人类的电力的产生铺了路。这一试验产生的连带成果就是避雷针的发明，避雷针可保护人类、建筑物和船只免受雷劈。

如果居里夫人不敢从事放射性物质的实验，世界将只能走到什么地步？所有做过X光检查的人都从她的研究中受益。然而，居里夫人由于在研究中长时间暴露在高强度的辐射下而染病，献身科学。其坚持不懈地冒着危险研究的行为，可以用她本人的话来解释：“生命中没有任何可以令人畏惧的事物，而只有等待人类理解的事物。”

极限科学是关于探索、发现和真知的科学。它是一种爱，一种牺牲。它是给未来留下珍贵的遗产。和消防员一样，极限科学家是英雄，这并非因为他们从事着危险的工作，而是因为他们将恐惧置之身外，从事着自己认为正确合理的研究。

富兰克林风趣地说：“要想魂销体殒之日永远不被人们遗忘，要么撰写出值得一读的作品，要么做出值得一写的事情。”富兰克林同时做到了这两个方面。可能某一天你也能做到。

时刻要做到小心谨慎，但是永远不要畏惧。



GETTING THE PICTURE

by Kathiann M. Kowalski

摄像术

Dive with marine biologists as they search for new life forms. Descend deep into an ice cave as a medical researcher collects samples of frozen microorganisms. Travel with mountain climbers to position seismic sensors on Mount Everest. See astronauts assemble the Space Station and conduct experiments in orbit.

While few people ever travel on such extreme expeditions, IMAX film technology lets us share in these and many more amazing science adventures. In fact, getting the film footage itself is an extreme adventure!

和海洋生物学家一同潜入海底，寻找新的生命形态吧。和医学研究者一同深入冰洞，收集冻结的微生物样本吧。与登山运动员一道，在珠穆朗玛峰上放置地震感应器吧。亲眼目睹宇航员在运行轨道上组装空间站和进行各种试验吧。

虽然没有多少人能够从事这些极限活动，但是IMAX全数字模式摄像技术却能让我们共享这些活动，也包括许多更令人惊奇的科学探索。实际上，获得摄像胶片卷本身就是一项极限探险。



SHOOTING ON LOCATION

Filmmakers will do almost anything for a great shot. In the IMAX film *Everest*, codirector David Breshears scaled the world's tallest mountain. While filming *Mystery of the Nile*, cameraman Gordon Brown evaded both bullets and a crocodile.

One time, Producer Alec Lorimore at MacGillivray Freeman Films wanted to film from a helicopter above a Navy aircraft carrier. To do that, he had to become “dunker certified.” This meant being strapped into a full-size helicopter mockup and falling 20 feet into a giant swimming pool. After the mockup sank and flipped upside down, Lorimore had to find his way out — blindfolded.

Producer Toni Myers at IMAX Space Ltd. didn't get to go up in space herself for *Space Station 3-D*, *The Dream Is Alive*, *Blue Planet*, and other films. Instead, real astronauts shot the film. Over a six-month period, they learned to compose shots, load film inside a black bag, manually focus and film scenes, and do other tasks.

现场拍摄

摄像者为拍摄一个伟大的镜头，愿不惜任何代价。在IMAX影片《珠穆朗玛峰》的拍摄中，导演之一的大卫·布赖什叶兹登上了这座世界最高峰。拍摄《尼罗河之谜》时，摄影师戈登·布朗则要躲开枪林弹雨甚至食人的鳄鱼。

制片人亚历克·劳利摩尔在MacGillivray Freeman Films电影公司工作时，一次打算拍摄一艘航空母舰上方的直升飞机。为此，他必须拍出“货真价实”的沉水场景，这就是说，必须把他绑在一艘直升飞机实体模型里，然后从20英尺高落入一个巨大的游泳池中。在直升飞机模型坠入池中并来个底朝天之后，劳利摩尔必须在被蒙住双眼的情况下寻找出路。

IMAX Space 有限公司的制片人托妮·迈尔斯在拍摄《3D太空站》、《太空梭之旅》、《蓝色星球》等影片时，她自己虽然不曾亲自进入太空，但是这些影片都是由真正的宇航员拍摄的。6个多月的时间里，这些宇航员学会了镜头组构，在黑袋中更换胶片，手动调焦，场景摄影以及其他一些摄像技术。

“在培训宇航员，让他们担当你的电影摄

“One fantastic advantage in training astronauts to be your cinematographers and directors is that they’re the best students and learners in the whole world,” says Myers. “We’re just very lucky to have such a talented pool of people to make the film.”

THE BIG PICTURE

“From the beginning, when you’re figuring out what the topic is and what the story is, you always want to be taking advantage of the IMAX medium,” says Lorimore. IMAX film and projection technology debuted in 1970, and from the start its goal has been to put people in the picture. The film is ten times as large as standard 35-millimeter film, so each frame has ten times as much visual information.

Projectors run the film at over 336 feet per minute, thanks to an incredibly steady film-advance mechanism. The high speed lets the projector shine very bright light through the film without burning it. Viewers see images on huge screens up to seven stories tall. Meanwhile, a powerful multispeaker system surrounds them with sound.

“The audience is sitting in the picture, and the picture is brighter and clearer and steadier than its counterpart from a conventional cinema,” explains Myers. “So you feel you’re really there.”

Large-format films use big cameras. The standard IMAX camera weighs 80 pounds, and each 1,000-foot roll of film weighs another five pounds. The “lightweight” camera carried on Mount Everest still was 42 pounds, fully loaded. Even in space, with microgravity, the camera is still bulky — about the size of a breadbox or microwave oven.

“We’re always faced with the challenges of how we’re going to put the camera where we want to put it to get the shot we need to tell the story,” says Lorimore. Filmmakers must mount cameras on aircraft, cables, and other devices so that they won’t fall off or create a hazard.

Gyroscope-stabilized mounts help to get smooth shots from a helicopter even in high

Gyroscope
A device consisting of a wheel or disk, the axis of which moves freely on a base so that it can maintain its orientation regardless of any movement of the base.

影技师和导演的过程中，令人惊奇的优点就是，他们可谓世界上最优秀的学生。”迈尔斯说道，“我们非常幸运，能够拥有这么多具有聪明才智的人拍摄影片。”

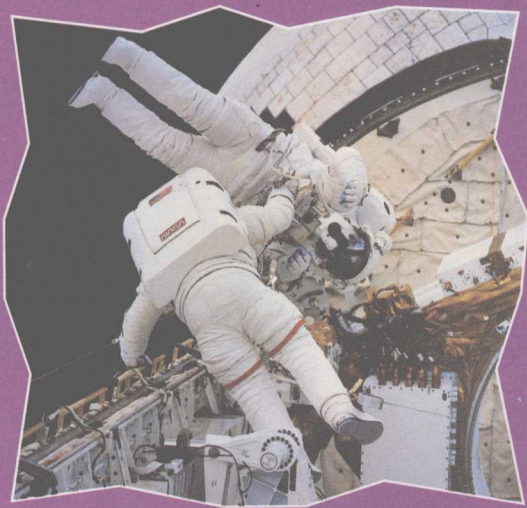
了不起的图像

“从你开始琢磨这个题目的意思以及故事内容时，你总是想充分利用IMAX这个媒体，”劳利摩尔说道。IMAX摄像和放映技术首次于1970投入使用。它的目标始终是将人们带入影片描绘的情境之中。其胶片大小是35毫米标准胶片的10倍，因此其画面的大小是实际的10倍。

多亏了这种手稳得惊人的胶片传送装置，放映机能够以每分钟336英尺的速度放映。如此快的速度使放映机在影片放映过程中，虽然一直发出强烈的光线，但也不会被烧坏。观众通过具有7层楼那么高的荧屏观看图像。与此同时，功率强大的多扬声器组合还为图像配上声音效果。

“观众们观看影片时仿佛身临其境，图像比传统电影院播放的影片更明亮、更清晰，也更稳定，”迈尔斯解释说，“因此你会觉得自己仿佛真的进入了影片的情景中。”

大型格式影片需要使用大的摄像机镜头。标准的IMAX摄像机重80磅，此



winds. Remote controls let filmmakers pan and tilt cameras to get just the right shot.

For *Coral Reef Adventure*, diver Howard Hall designed a special camera housing for filming 300 feet under water. One of the main camera systems weighed in at around 250 pounds. But at large depths, the camera must withstand tremendous pressure.

Filming in space brings challenges, too. “Normal” 3-D filming shoots two side-by-side rolls of film — one for each eye — to produce depth perception when viewers watch with special “glasses.” But for *Space Station 3-D*, the IMAX camera had to fit inside a NASA locker. Engineers devised a way to capture left- and right-eye images on the same strip of film — but then each roll lasted only half the usual time.

3-D filming adds other challenges. Moving the camera during shots heightens the 3-D sensation. But having something halfway in the picture at the frame’s edge would create an uncomfortable sensation. And unless the object closest to the camera is in focus, viewers would have a huge blob in their faces.

外，1000英尺长的胶卷重5磅。珠穆朗玛峰上用来摄像的“轻便型”摄像机全套配齐也有42磅重。即使在太空地球重力非常微弱的情况下，一个体积只有烤面包机或微波炉大小的摄像机仍然可以算是“庞然大物”。

“向来我们都得面临着挑战，那就是如何将摄像机放在我们希望它放置的地方，以拍摄到表现故事情节的镜头，”劳利摩尔说道。电影摄制者必须在飞行器上安装摄像机，还要装上电线和其他设备，这样它们才不至于掉下来而酿成任何灾难。装在陀螺仪稳衡机架上的摄像机（陀螺仪带有一个旋转的轮子或圆盘，旋转轴的方向可以不随底基的运动而改变——译者注）甚至有助于从直升飞机上而且在大风天里拍摄到平稳的图像。遥控装置使摄制者在通过摇镜头和侧倾镜头作调整时也能获得绝妙的图像。

在拍摄《珊瑚奇观》时，潜水员霍华德·霍尔设计了一个特殊的摄像头外壳，以便能在水面下300英尺的海域摄像。其中一个主要摄像系统重达250磅左右。不过，深水下，摄像机必须能够承受住巨大的压力。

同样，在太空中摄像也面临着许多挑战。“正常”的三维影片左右两边并行拍摄——模仿人的左右两眼——观众带着特殊的“眼镜”就可以体验到这种深度感觉效果。然而《3D太空战》中，IMAX摄像机必须安置在国家航空航天局研制的锁扣装置中。工程师设计了一种方法能够在同一张胶卷中让左右两眼都看得清图像，不过这种胶卷每卷持续的时间只有平常的一半。

三维摄影还提出了更多的挑战。在拍摄过程中移动摄像机可以增加三维效果。不过，画面的边缘处若半路出现了什么东西的话，那会令人产生极不舒服的视觉效果。此外，如果距离摄像机最近的物体聚焦不好的话，观众们的脸上会出现巨大的光斑。

OF COURSE. . .THE STORY!

The best documentaries tell a compelling story with characters the audience cares about. To find them, filmmakers start with careful research and talk to scientific experts. *Journey into Amazing Caves* featured cavers Nancy Aulenbach and Hazel Barton as they explored caves in remote locations and extreme environments. *Dolphins* focused on marine biologist Kathleen Dudzinski and her research on dolphin communication in the wild. *Space Station 3-D* shared the anticipation and preflight preparations of astronaut Bill Shepherd and his wife Beth, an astronaut fitness trainer.

Writers script segments and plan scenes to shoot. Along the way, filmmakers become quasi-experts themselves. After all, they need to understand what they're filming in order for a movie to make sense.

Of course, it's hard to predict everything that will happen out in the field. "We always say the scene list is just a starting point," Myers says, of when her team prepares an astronaut crew to film in space. Indeed, "If an alien puts his face in the window, we want it."

After filming comes extensive editing to get the movie down to 45 minutes or so. Filmmakers pick and choose carefully to tell the story the best way possible. For *Coral Reef Adventure*, Lorimore says, editing took about two years. Filmmakers

当然，接下来讲讲故事情节！

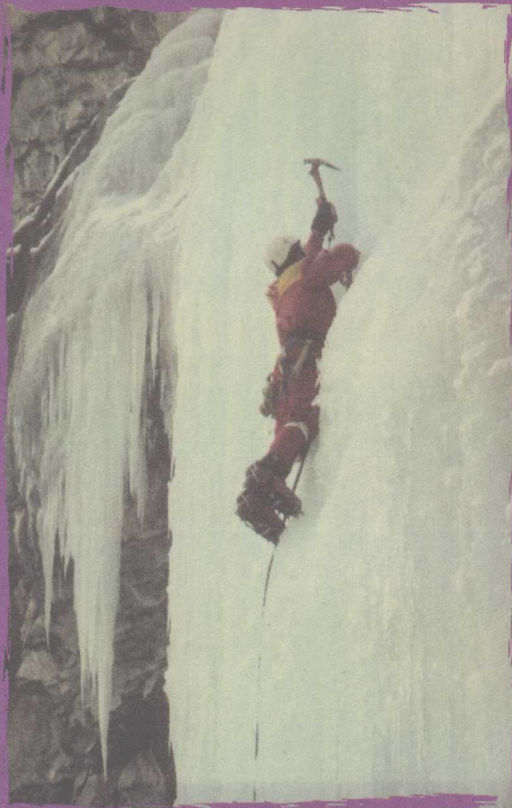
最出色的纪录片讲述观众们最关心的人物的故事。为了找到这些素材，摄影者仔细钻研，与该领域的学术专家进行探讨。《别有洞天》描述了两位酷爱洞穴的探险家南希·奥兰巴赫和黑兹尔·巴顿探索地处边陲、环境危险的洞穴的情景。《海豚》着重讲述了海洋生物学家凯瑟琳·杜兹斯基及其对野外海豚间相互交流方式所进行的研究。《3D太空站》使观众们体会到宇航员比尔·谢泼德及其妻子、宇航员健身教练贝丝的强烈期望，看到了他们飞行前所作的充分准备。

作家们描述分解镜头，设计拍摄场景。与此同时，摄影师自己成了半个行家。毕竟，为了使一部影片合情理，他们必须了解自己要拍摄的对象。

当然，在野外将会发生什么情况是很难预料的。“我们一直认为，场景列表只不过是一个起始点，”迈尔斯谈到她的团队准

备组建一支宇航员工作组去从事太空拍摄时说。确实，“如果一个外星人将它的面孔展露在窗口，这正是我们所想摄录到的镜头。”

拍摄工作完毕后，需要对此进行大量的剪



want to give audiences a unique and thrilling experience. But they hope viewers take away something more, too.

“What we really want to communicate are the larger, broader ideas that hopefully will excite the audience and stimulate them to find out more,” notes Lorimore. “We’re trying to communicate to them the importance of the topic and how it relates to them and to the world we live in.”

In *Mystery of the Nile*, for example, audiences see black pyramids built thousands of years ago by the Kush civilization in Sudan. The region was once lush rain forest. Now it is a sandy desert, due in part to the ancient kingdom’s mining and smelting practices. “One thing I hope that people get out of the Nile experience is just how fragile life can be and how much things can change if we don’t pay attention to what we’re doing,” says Lorimore.

IMAX photography lets people share in the experience of space travel and other awesome adventures. But, says Myers, “Never underestimate your own chances of getting there yourself.” Look at Susan Helms. She felt so inspired by watching shuttle astronauts in *The Dream Is Alive* that she went on to become an astronaut herself and appeared in *Space Station 3-D*.

What extreme science adventures might lie ahead in your future?



辑工作,将影片缩短为45分钟左右的作品。摄影师认真地挑选,使得影片尽可能以最妙的方式表现这些故事。劳利摩尔谈到,影片《珊瑚奇观》的编辑工作进行了约两年。摄影师希望给观众一个独一无二、激动人心的体验。当然,他们希望观众的收获远不止于此。

“我们真正想与观众沟通的是更深入、更广泛的想法,能够让观众充满激情,激励他们进一步探索,”劳利摩尔说道,“我们一直努力和观众交流,让他们知道这个主题的重要性,以及这个话题与他们以及与我们居住的世界有着何等关系。”

例如,影片《尼罗河之谜》中,观众看到了数千年前苏丹库什文明时代建造的黑色金字塔。该地区曾经是茂盛的雨林地带。古代王国的开采和冶炼行为,是使这一地区变成了一望无际的沙漠的部分原因。“我希望人们能够从尼罗河中获取经验,懂得生命是多么的脆弱,懂得如果我们对自己现在的行为熟视无睹,情况将会发生多么巨大的变化,”劳利摩尔说。

IMAX摄影术使人们体验到太空遨游以及其他一些令人敬畏的探险活动。不过,“绝不要认为你自己没有可能亲身从事那些活动,”迈尔斯说道。例如,苏珊·赫尔姆斯,看过《别有洞天》之后,她备受片中宇航员的鼓舞,当了一名宇航员,出现在《3D太空站》中。

你的未来还将存在着什么样的极限科学探险呢?