

スター・サイエンティスト白書2020

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JST-RISTEX 科学技術イノベーション政策のための科学「スター・サイエンティストと日本のイノベーション」プロジェクト

2020年1月6日

早稲田大学ビジネス・ファイナンス研究センター

科学技術とアントレプレナーシップ研究部会

ワーキングペーパーシリーズ No. 002

はじめに

- この白書は、JST-RISTEX科学技術イノベーション政策のための科学「スター・サイエンティストと日本のイノベーション」が構築した、「スター・サイエンティスト・コホート・データセット」を活用し、スター・サイエンティストの現状分析を行なったものである。
- スター・サイエンティストとは、卓越した研究業績を残す少数のサイエンティストのことを指し、通常の研究者に比べて、多くの論文を出版し、多くの被引用を集め、特許を数多く出願する。また通常のサイエンティストと比較して優秀な博士課程の学生やポスドクを育成する傾向がある。スター・サイエンティストは、通常の研究者と比べ、ベンチャー企業を設立する傾向にあり、またスター・サイエンティストの関わるベンチャー企業は他のベンチャー企業と比較して、高い業績を生み出している。更に産業界と関わるスター・サイエンティストは、研究業績も上がるという、サイエンスとビジネスの好循環が発生すると言われている。
- このスター・サイエンティストに関する現象は、今現在の日本においても発生しているのだろうか。この白書をご覧いただくことで、その答えの一端を見つけていただければ幸いである。

プロジェクト代表: 牧 兼充 (早稲田大学ビジネススクール准教授)

スター・サイエンティスト白書 ポイント(1): 中国の台頭

- 現行のスター・サイエンティストの数に関する国別ランキングをみると、ショート・リストとロング・リストのいずれにおいても、全分野の合計で、米国が圧倒的上位を占めており、英国がそれに続いているが、3位の中国も2位の英国とほぼ同数である。中国は、分野別では特に、工学では米国を抜き両リストにおいて1位、材料科学では米国とほぼ同数でロング・リストでは1位となっている。その他、化学、コンピュータ科学、環境・生態学、地球科学、数学でも両リストで1位の米国に次いで2位となっており、大きな存在感を示している。
- 高被引用論文の国別割合の時系列変化をみると、米国は全分野の合計で1980年代から直近まで圧倒的に1位であるが、全体に占める割合は低下してきており、高被引用論文の生産国の多様化が進んでいる。特に中国の伸びが目覚ましく、直近では工学、材料科学、コンピュータ科学では米国を抜いて1位となっている。これらの3分野のいずれにおいても、特に2008年以降に中国が急激な伸びを見せている。農学、化学、環境・生態学、数学に関しても近年の中国の伸びは目覚ましく、米国を急追している。
- こうした高被引用論文を生産している中国の研究機関として、中国科学院の存在が際立っている。研究者の母数が大きいいため他の機関と単純には比較できないが、複数の分野において、2005-2009年の機関別ランキングに登場し、2010-2014年にはさらに順位を上げており、高被引用論文の生産アクティビティの高まりが時系列上で見て取れる。
- 一方で、臨床医学、免疫学、微生物学、分子生物・遺伝学、神経・行動科学、薬理・毒物学、精神医学・心理学といった、医学関連の分野では、スター・サイエンティストや高被引用論文に関して中国の存在感はまだ確認されない。

プロジェクト副代表: 隅藏 康一 (政策研究大学院大学教授)

スターサイエンティスト白書 ポイント(2): 日本の現状

- 現行のスター・サイエンティストの数に関する国別ランキングをみると、ショート・リストとロング・リストのいずれにおいても、全カテゴリーの合計で、日本は12位である。動植物科学ではショート・リストで3位、ロング・リストで5位となっており、化学ではいずれも5位、材料科学では5位・6位、免疫学では4位・6位となっており、これらの分野では一定の存在感を示している。
- しかしながら、機関別の高被引用論文のランキング上位の時系列変化を見ると、上に挙げたいずれの分野においても、2009年以前はいくつかの日本の機関が10位以内に登場していたにもかかわらず、2010-2014のランキングでは10位以内に入っている日本機関はない。
- また、高被引用論文の国別割合の時系列変化をみると、全分野の合計において、2000年代に入ってから日本が占める割合は緩やかに低下してきている。分野ごとに直近4年間の傾向をみると、免疫学で若干の増加がみられ、動植物科学と化学ではほぼ変化なしであるが、材料科学では明らかな減少傾向がみられる。
- 材料科学といった、他の分野と比べて国際的な競争の中で日本が存在感を示しているはずの分野においても、近年の中国の台頭に押されて、日本の国際的な存在感が低下している可能性がある。

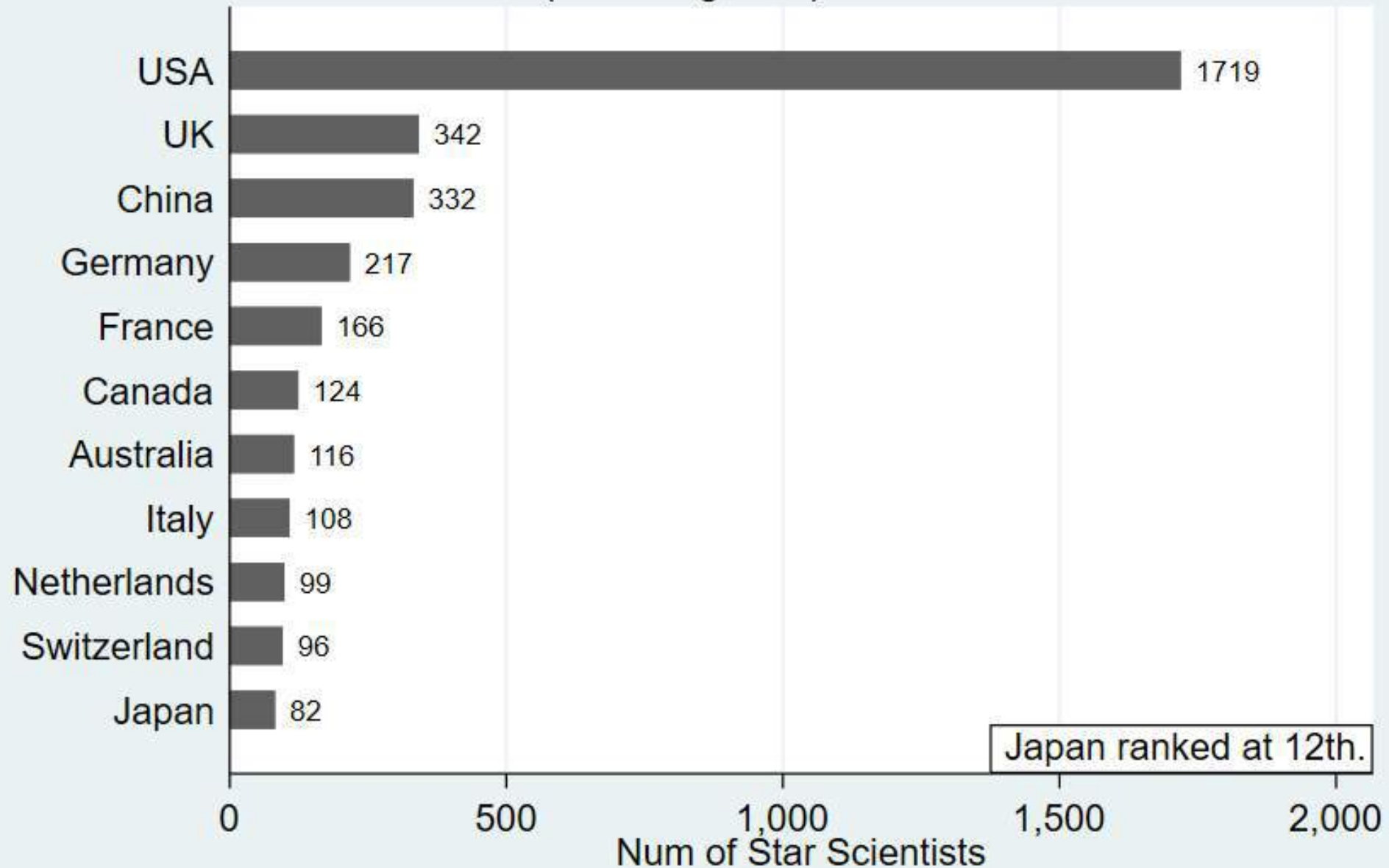
プロジェクト副代表: 隅藏 康一 (政策研究大学院大学教授)

1. Ranking of Countries by # of Star Scientists

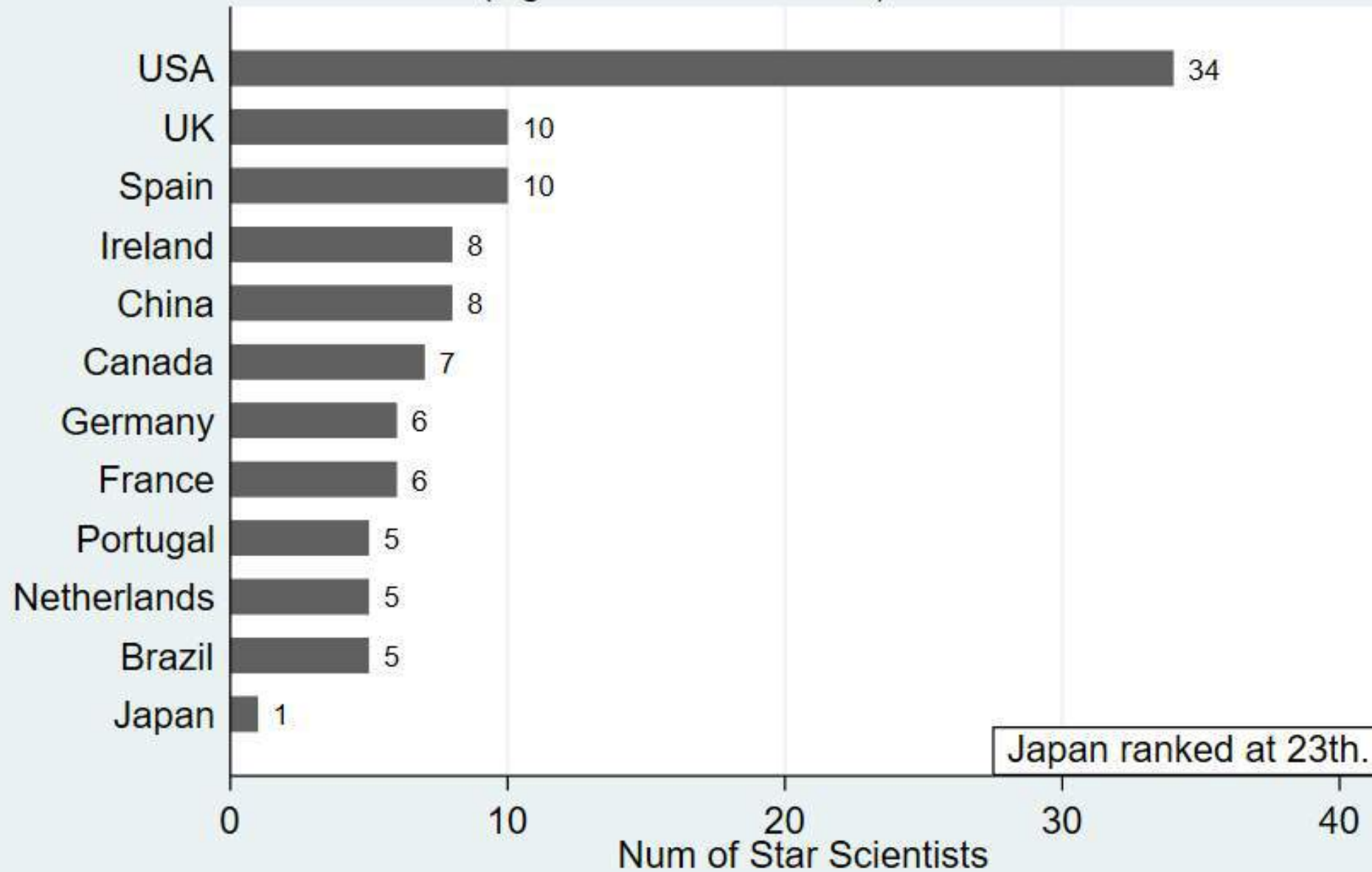
- 国別にスター・サイエンティストの数を集計し, 分野別(+全分野)でランキング化する
 - ショートリスト, ロングリストのそれぞれにおいて行う
 - Top10となる国とその人数を棒グラフ化
 - 同率10位の国がある場合など10カ国以上掲載する場合もあり
 - 日本が11位以下の場合, 最下部に掲載(スターが0人の場合その旨を記載)
- 各研究者の所属国の推定方法
 - 各研究者について, HCP数を1or2番目に多く出した所属機関とその所属国をWoSより特定.
 - 第1所属国・第2所属国が別国の場合は2つの国に1人ずつカウント(整数カウントの考え方)

1-1. Ranking of Countries by Num of Star Scientists(Short List)

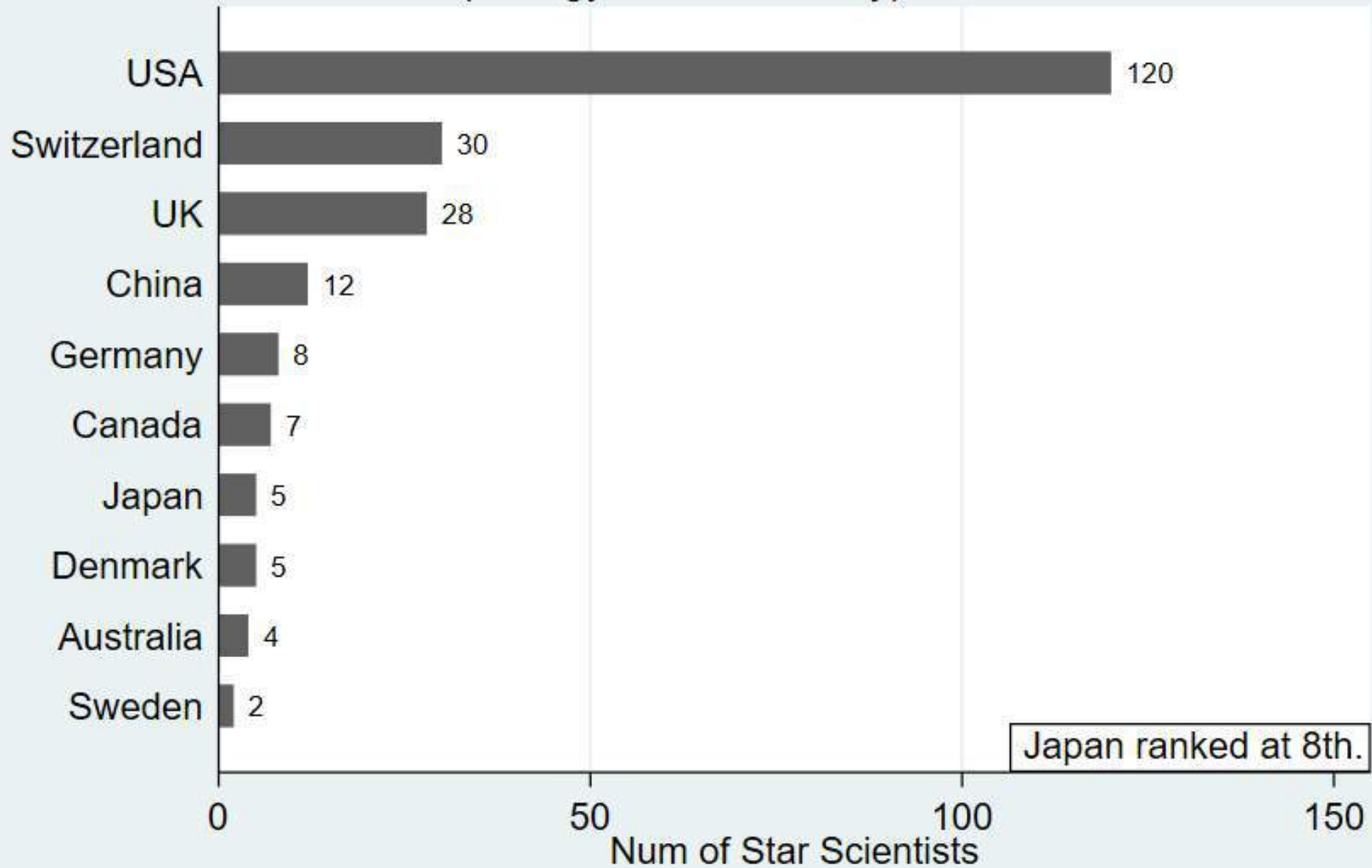
Ranking of Countries by Num of Star Scientists(Short List) (All Categories)



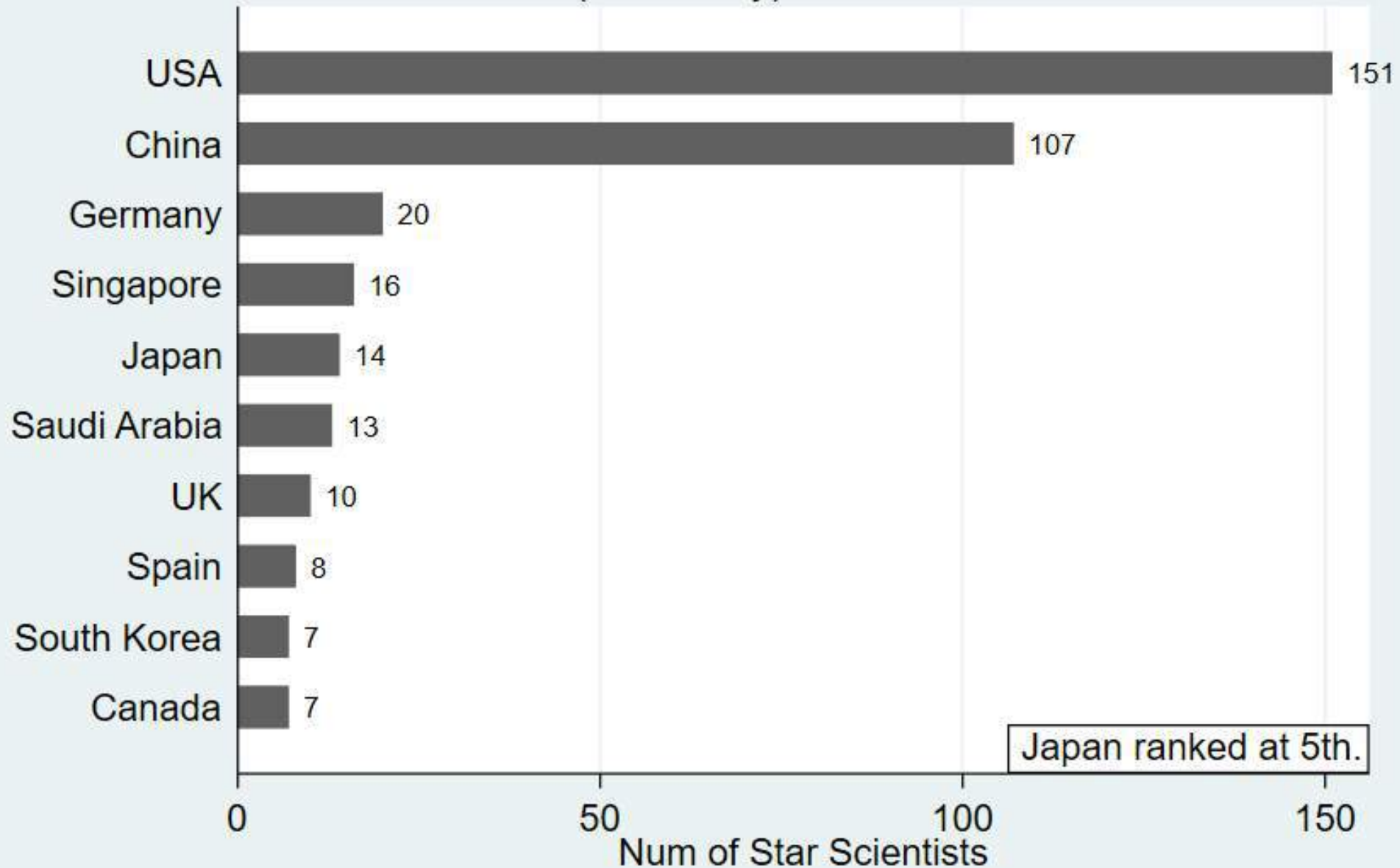
Ranking of Countries by Num of Star Scientists (Short List) (Agricultural Sciences)



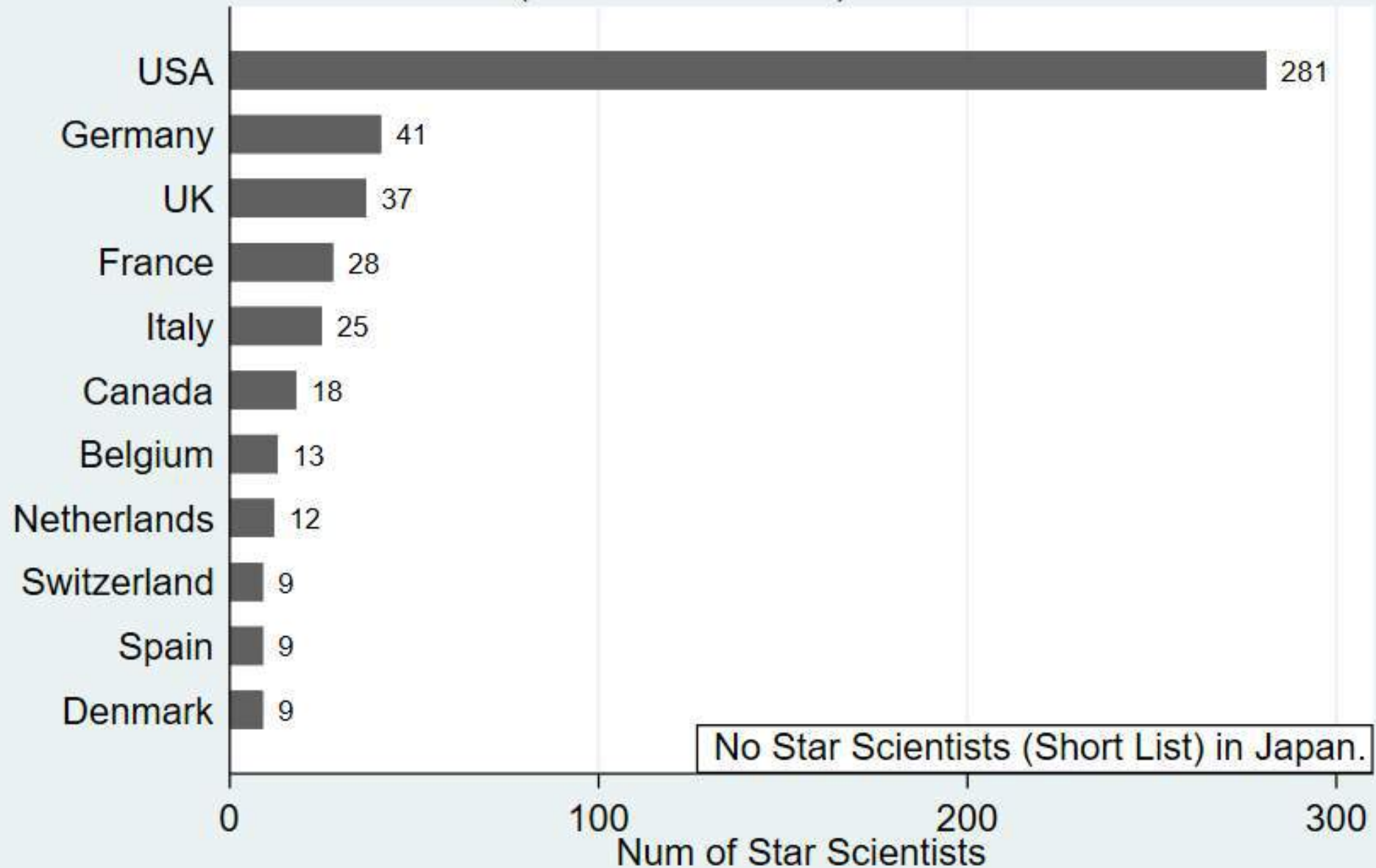
Ranking of Countries by Num of Star Scientists (Short List) (Biology & Biochemistry)



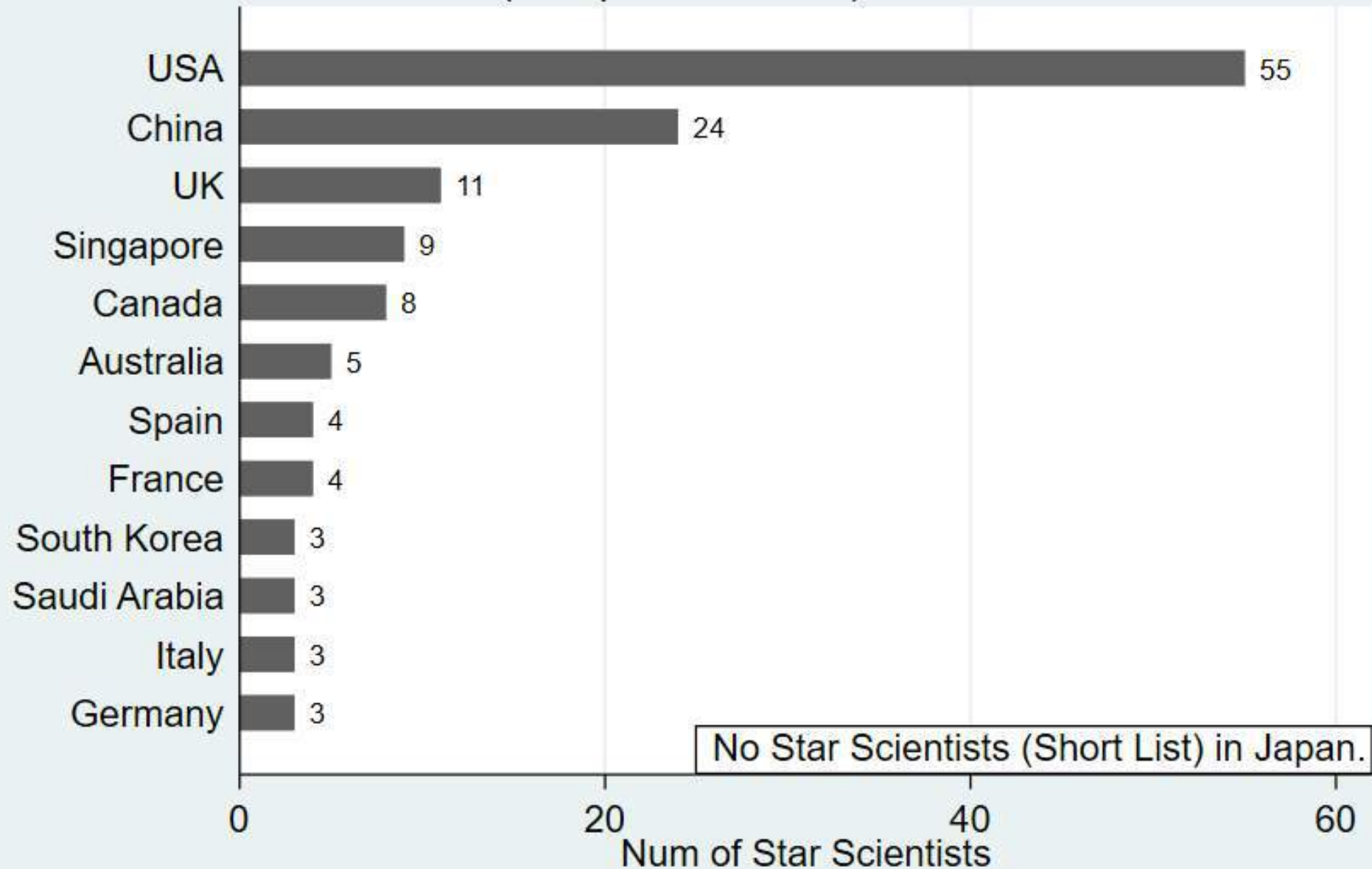
Ranking of Countries by Num of Star Scientists (Short List) (Chemistry)



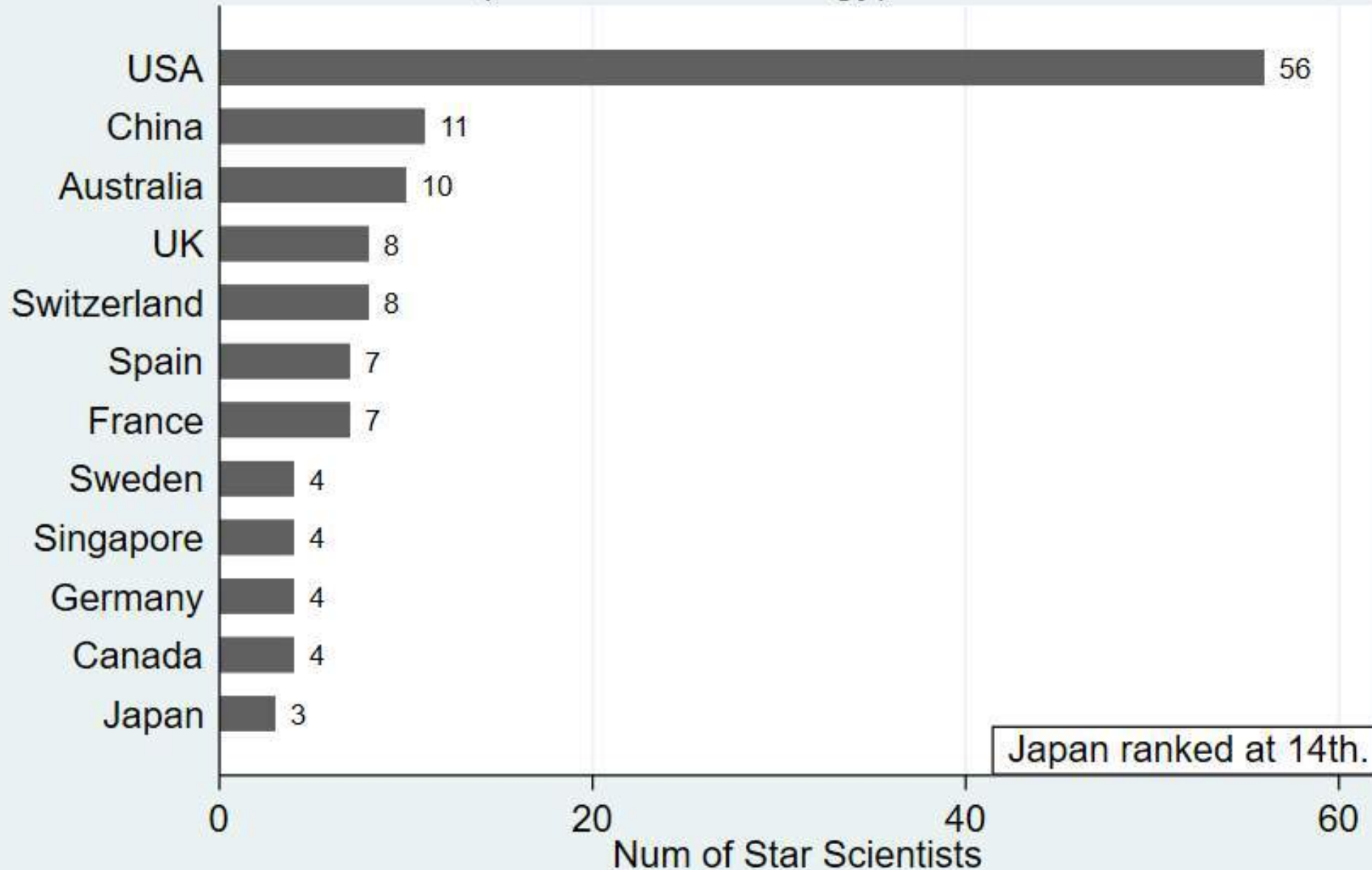
Ranking of Countries by Num of Star Scientists(Short List) (Clinical Medicine)



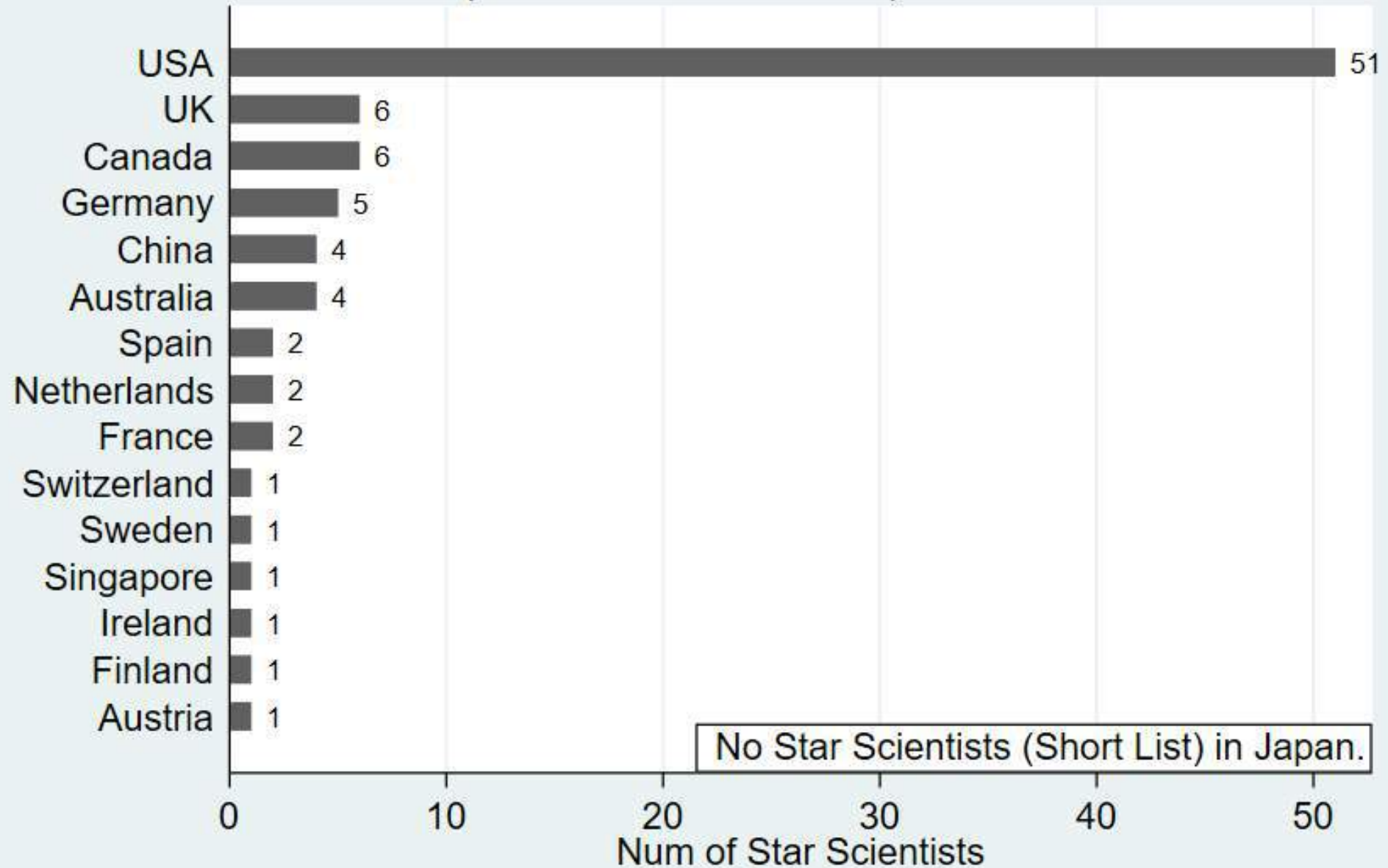
Ranking of Countries by Num of Star Scientists(Short List) (Computer Science)



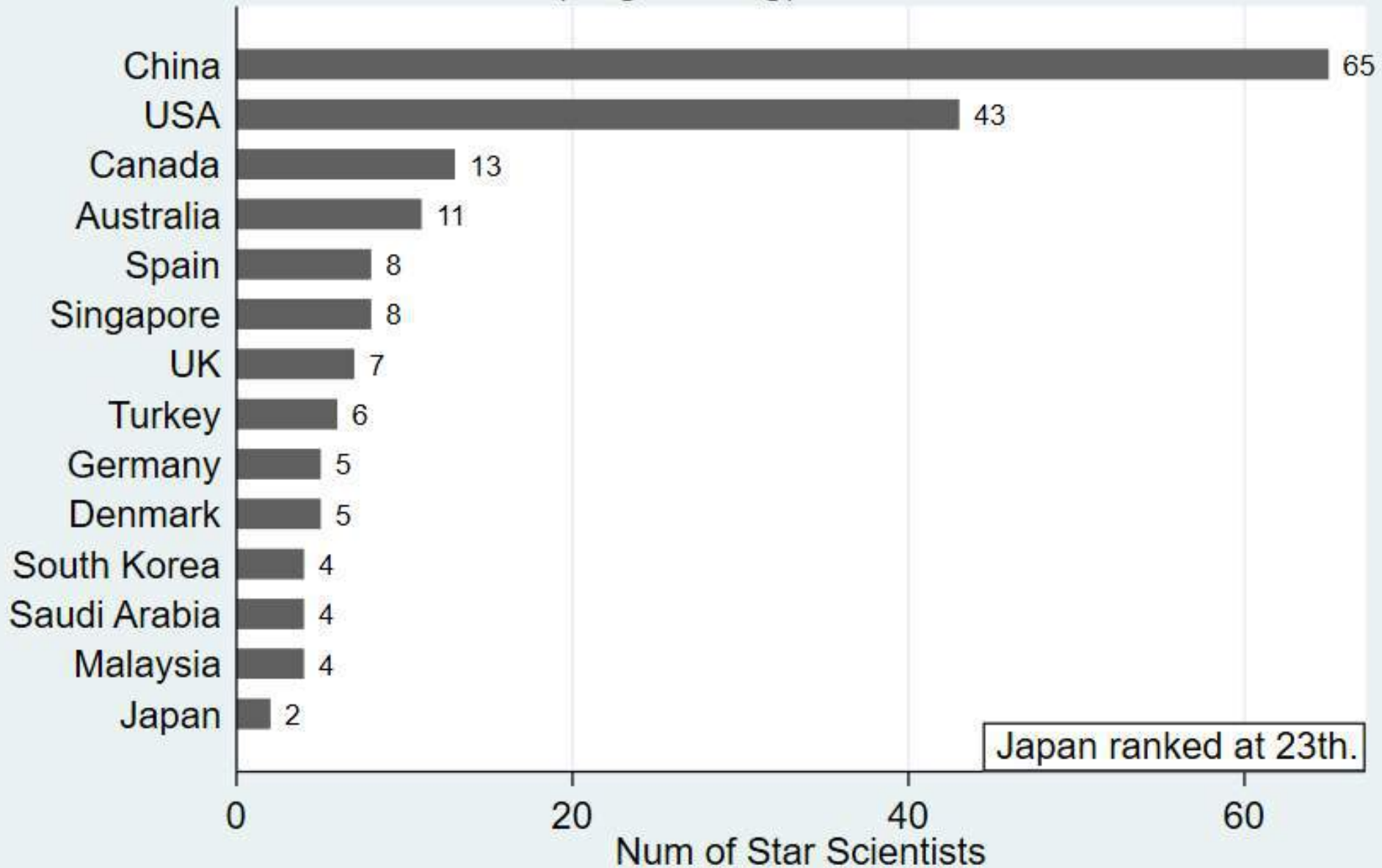
Ranking of Countries by Num of Star Scientists (Short List) (Environment/Ecology)



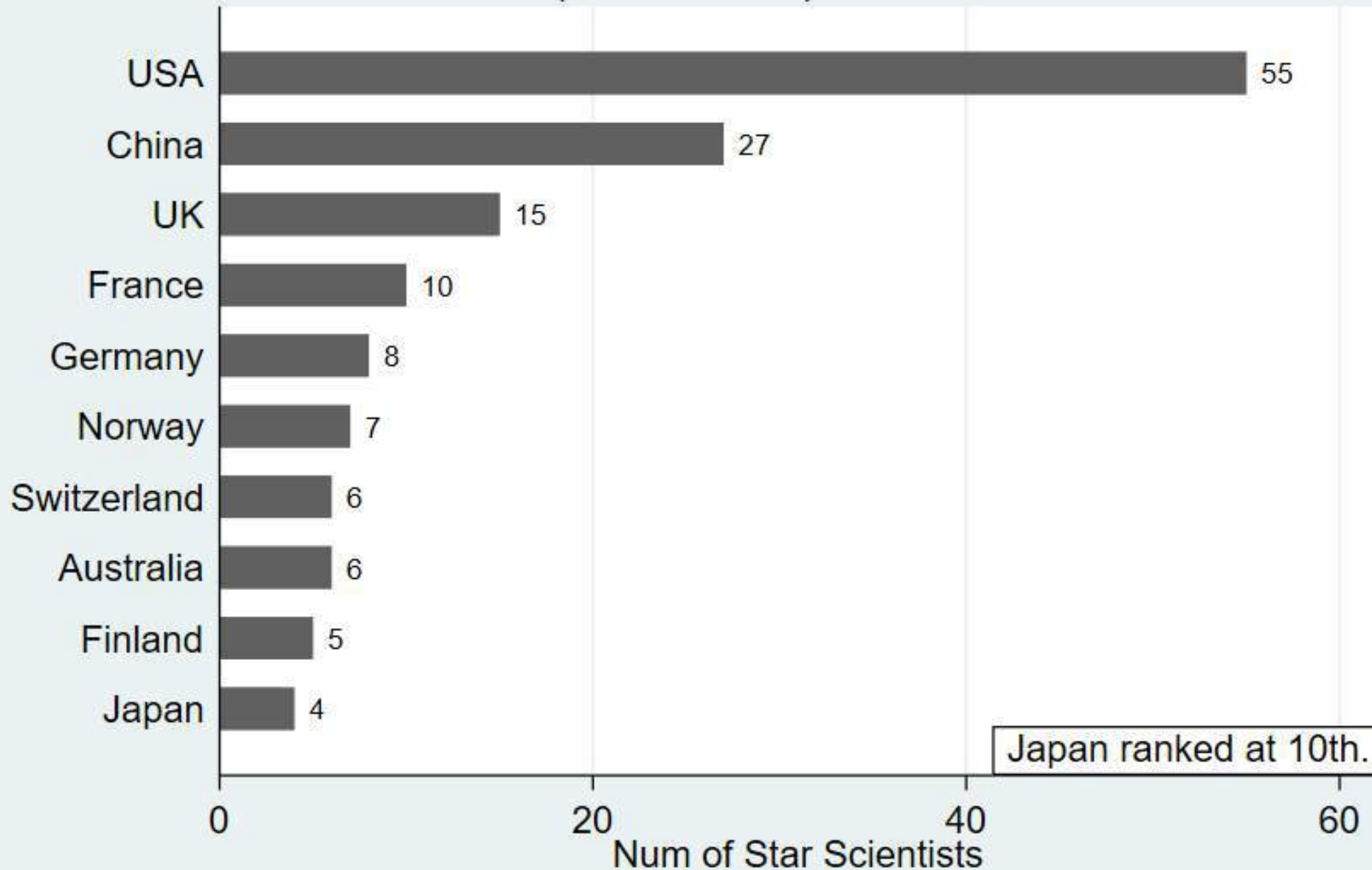
Ranking of Countries by Num of Star Scientists(Short List) (Economics & Business)



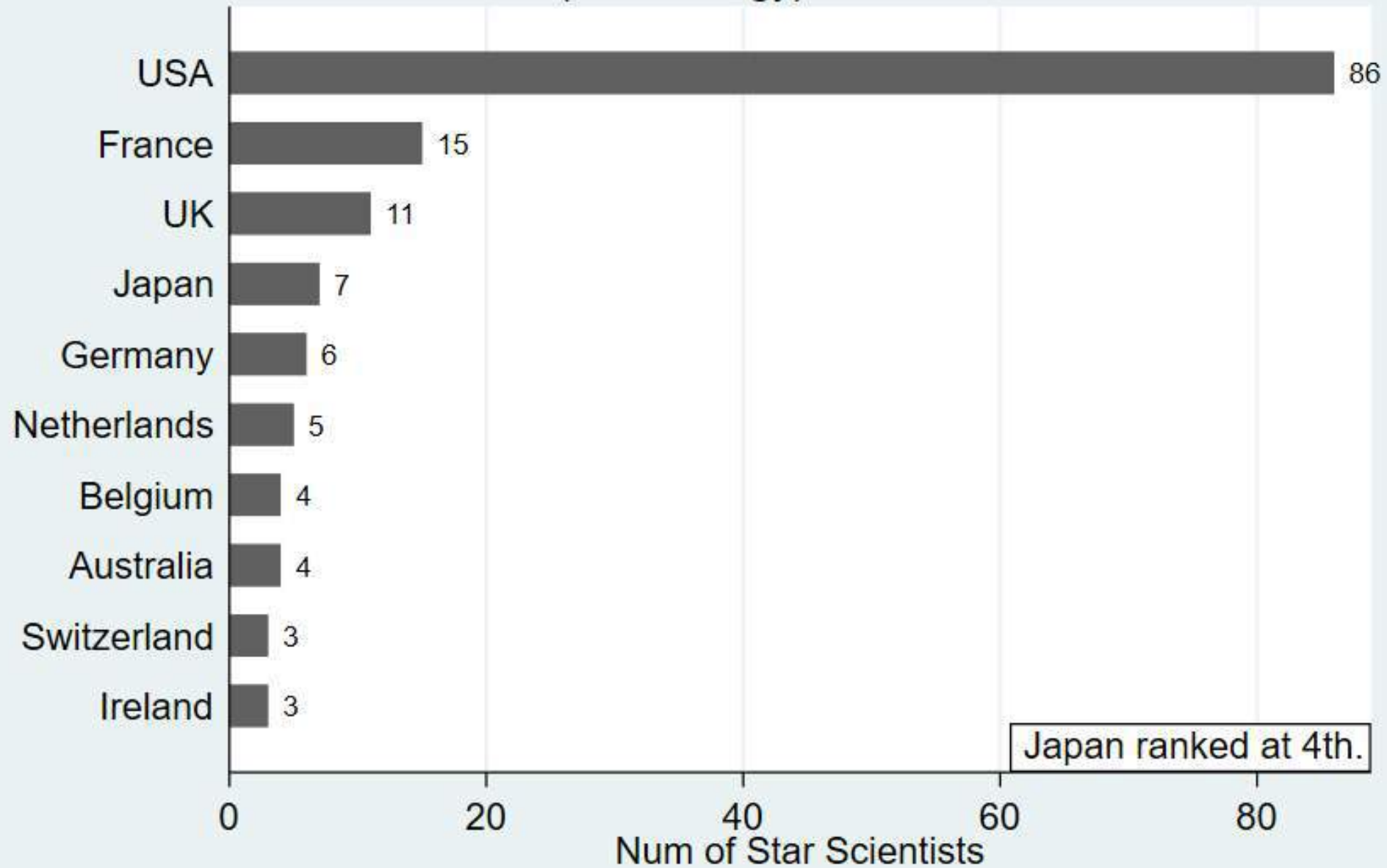
Ranking of Countries by Num of Star Scientists (Short List) (Engineering)



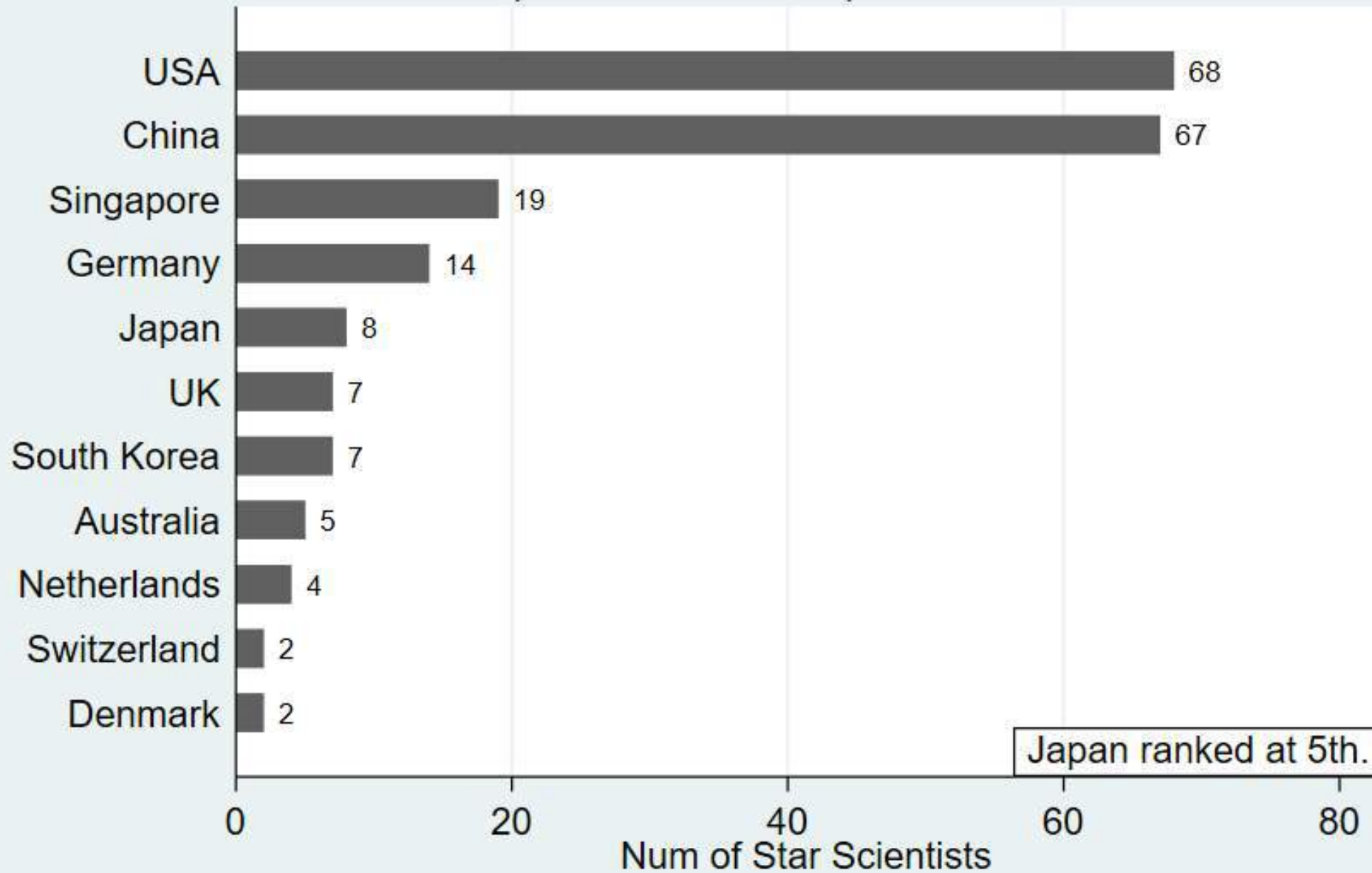
Ranking of Countries by Num of Star Scientists(Short List) (Geosciences)



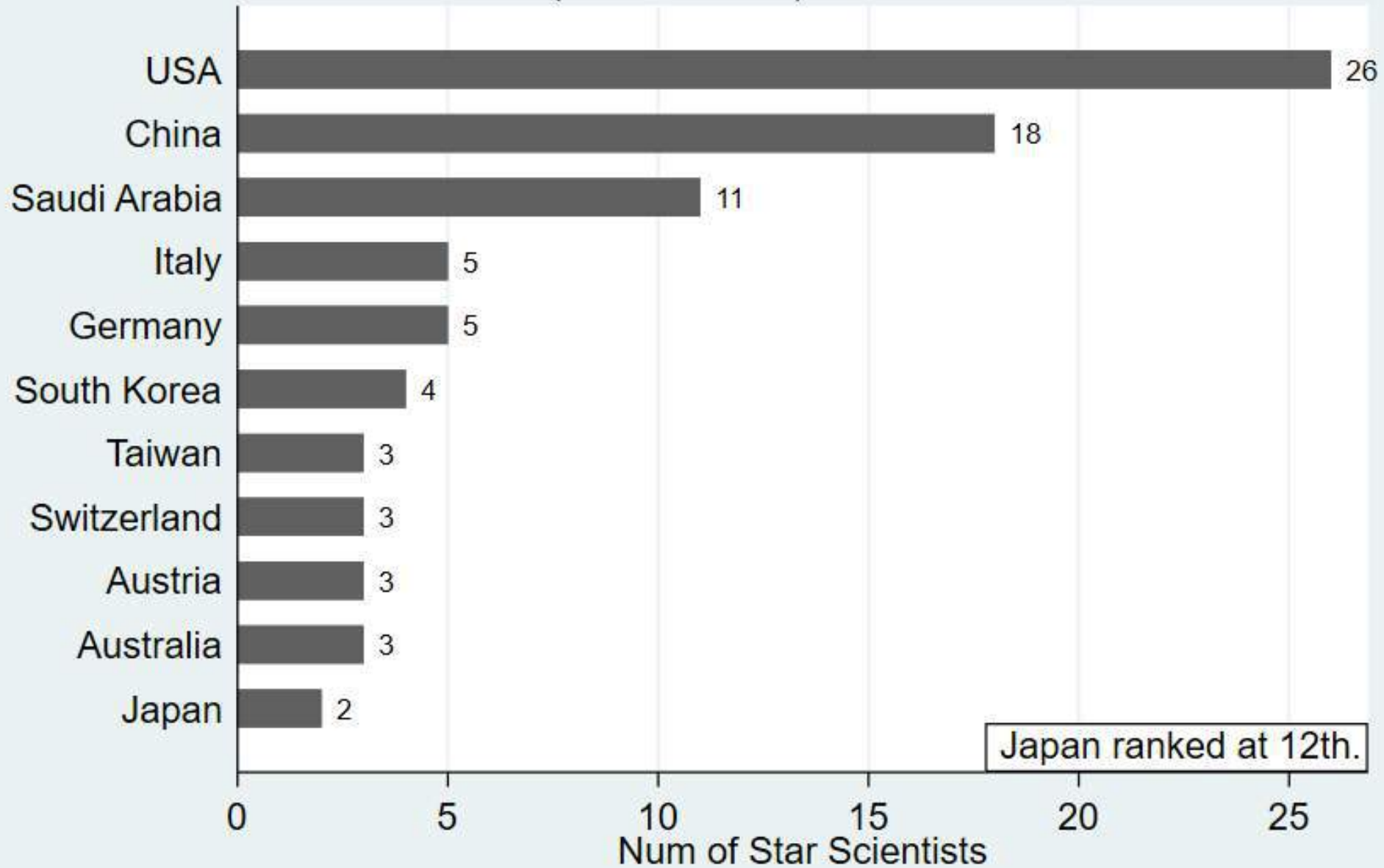
Ranking of Countries by Num of Star Scientists (Short List) (Immunology)



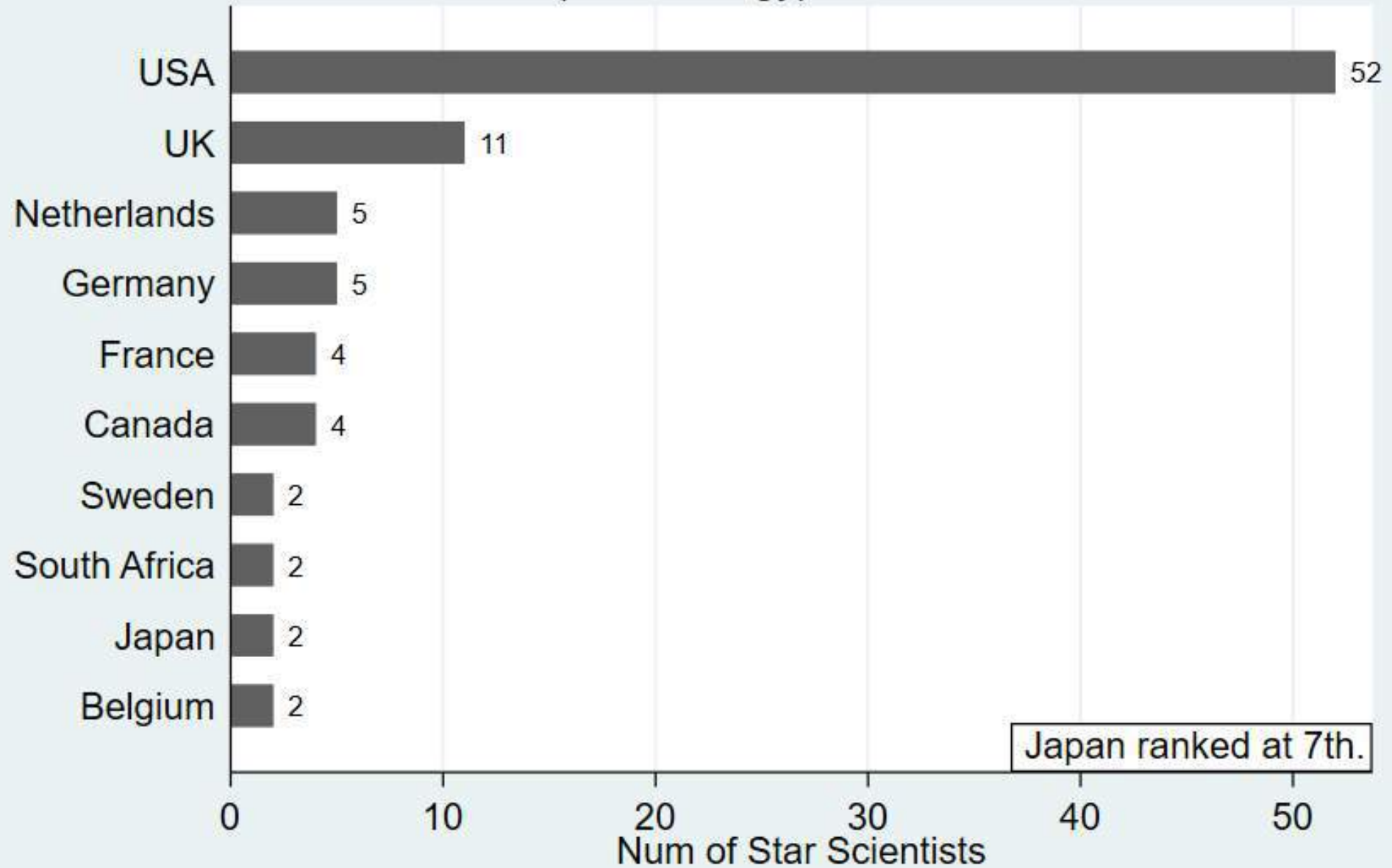
Ranking of Countries by Num of Star Scientists(Short List) (Materials Science)



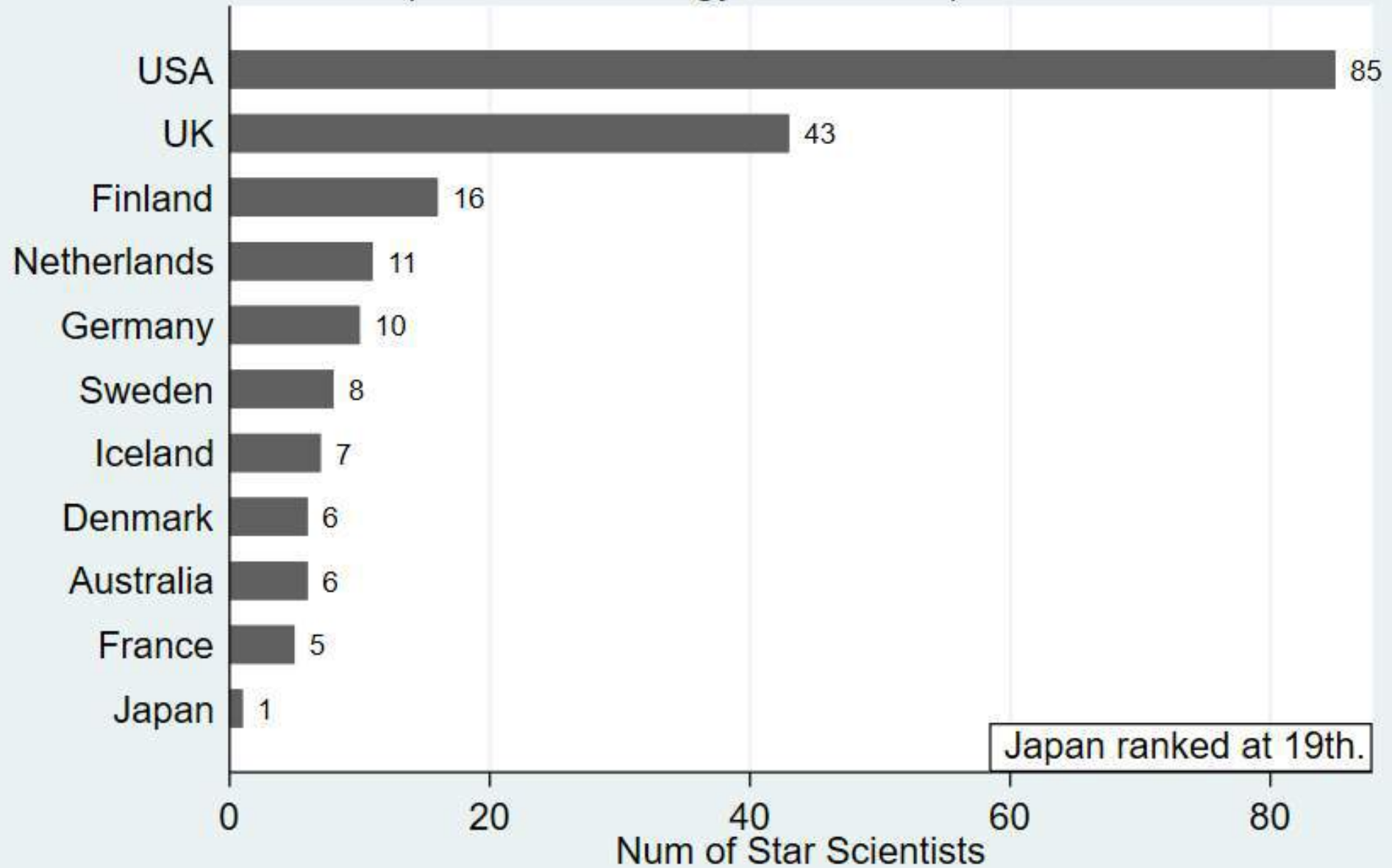
Ranking of Countries by Num of Star Scientists (Short List) (Mathematics)



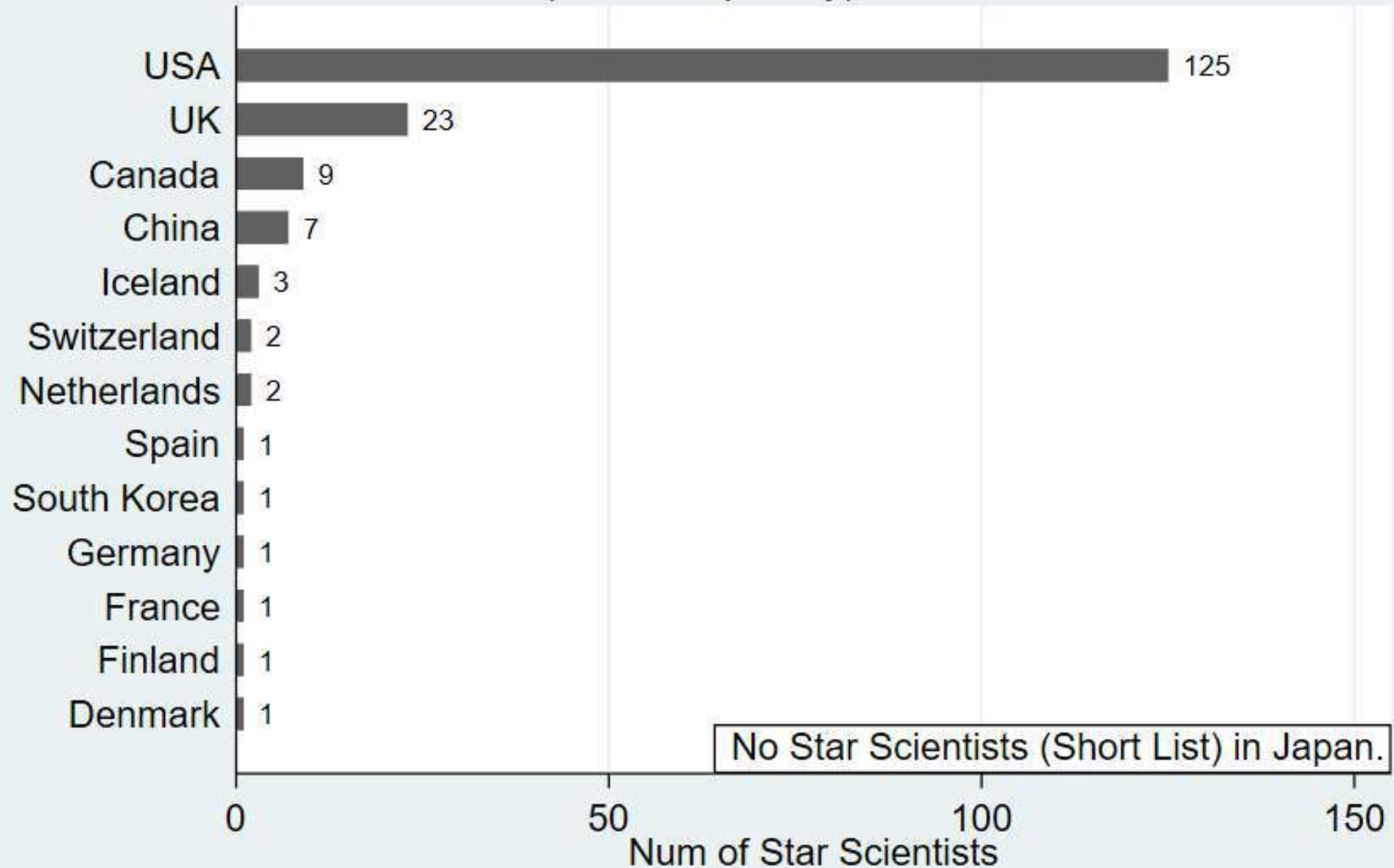
Ranking of Countries by Num of Star Scientists (Short List) (Microbiology)



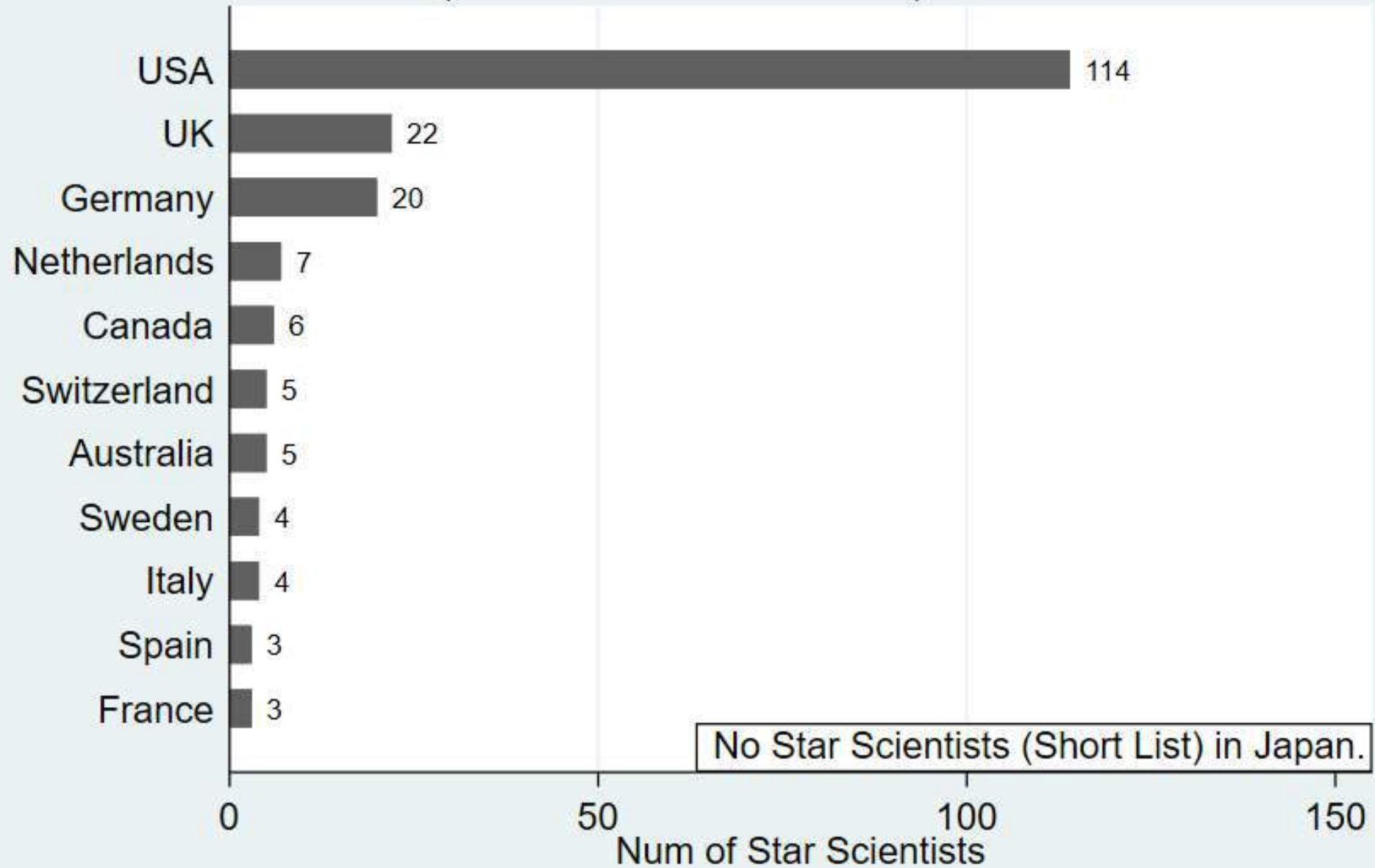
Ranking of Countries by Num of Star Scientists(Short List) (Molecular Biology & Genetics)



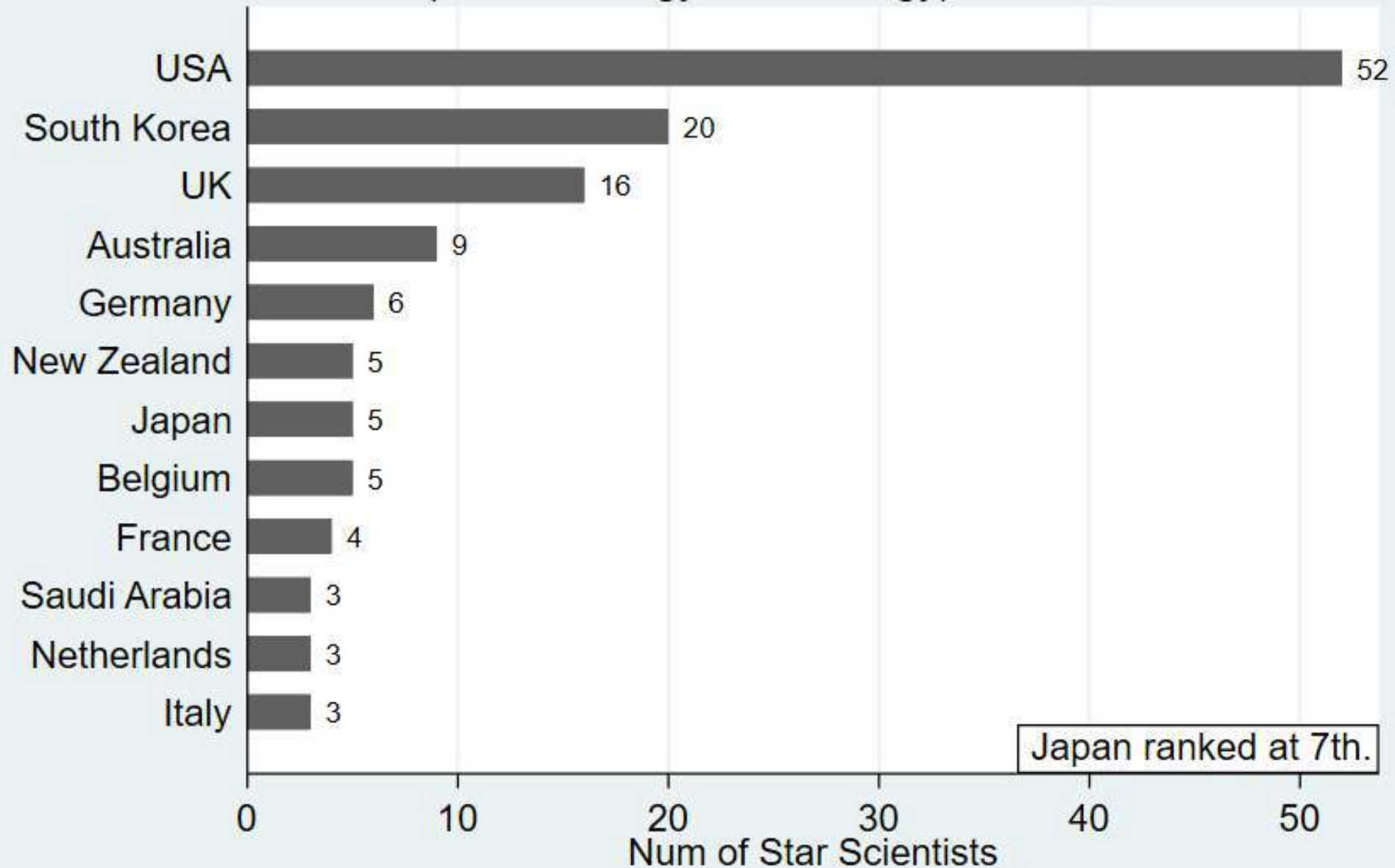
Ranking of Countries by Num of Star Scientists(Short List) (Multidisciplinary)



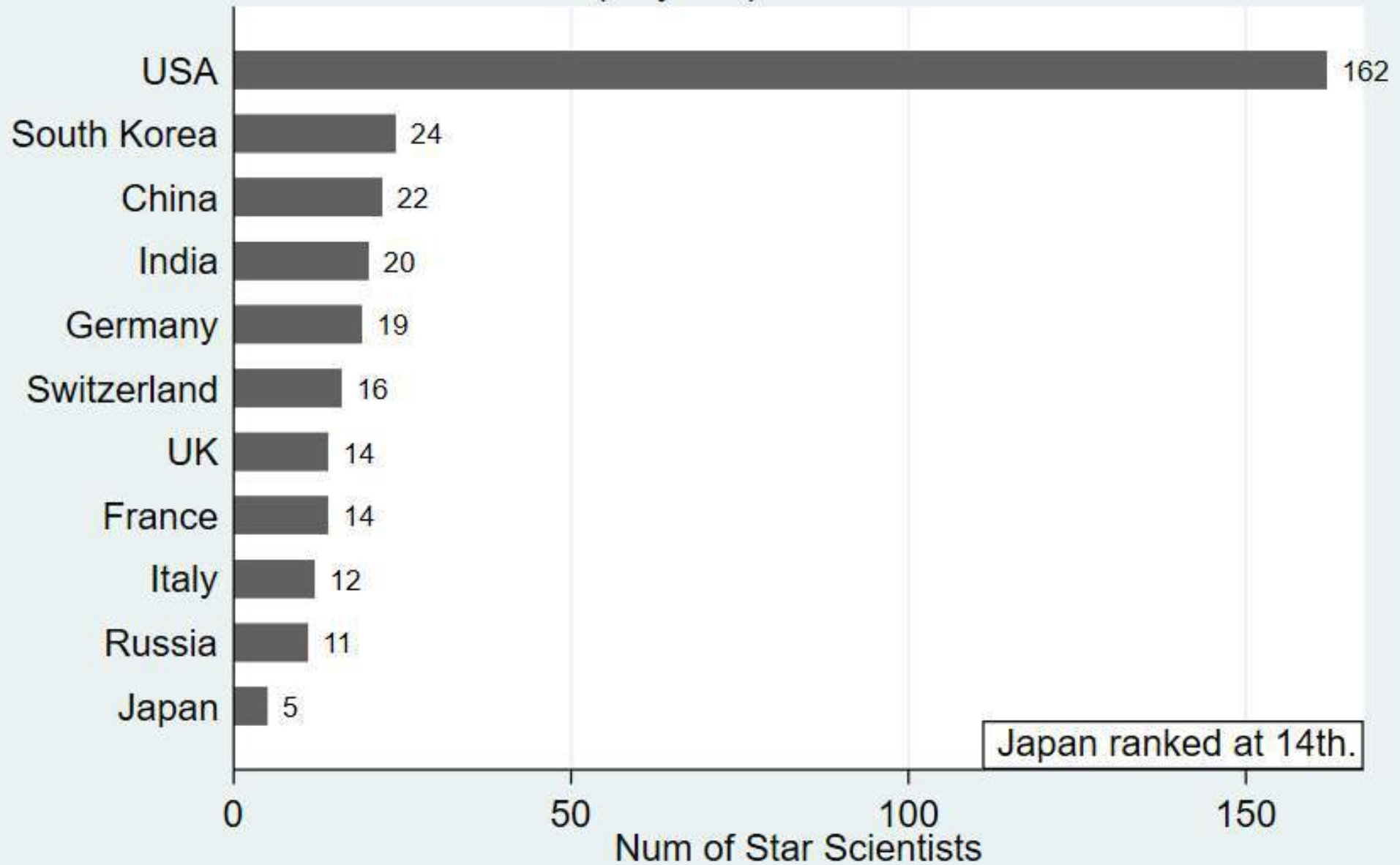
Ranking of Countries by Num of Star Scientists(Short List) (Neuroscience & Behavior)



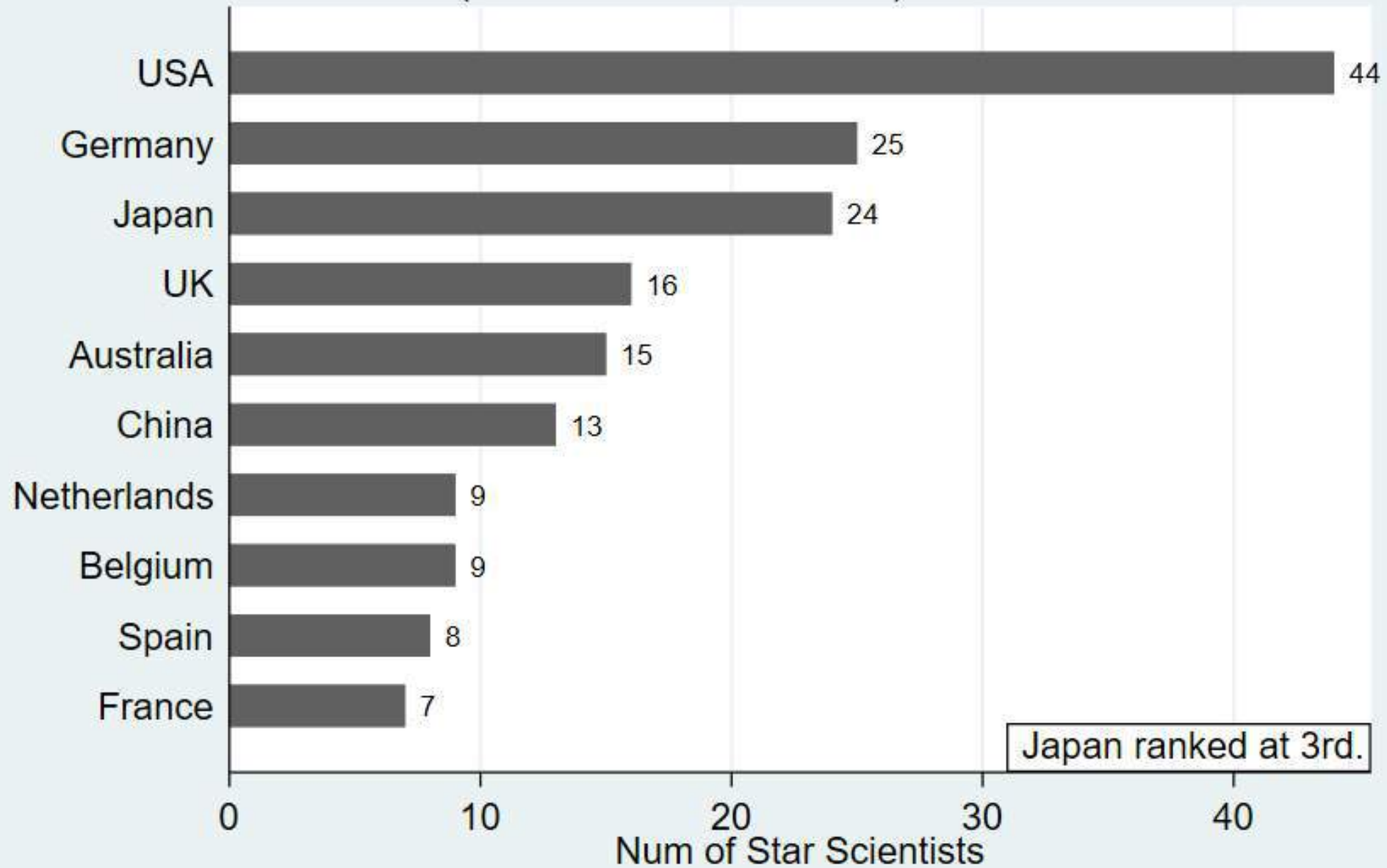
Ranking of Countries by Num of Star Scientists (Short List) (Pharmacology & Toxicology)



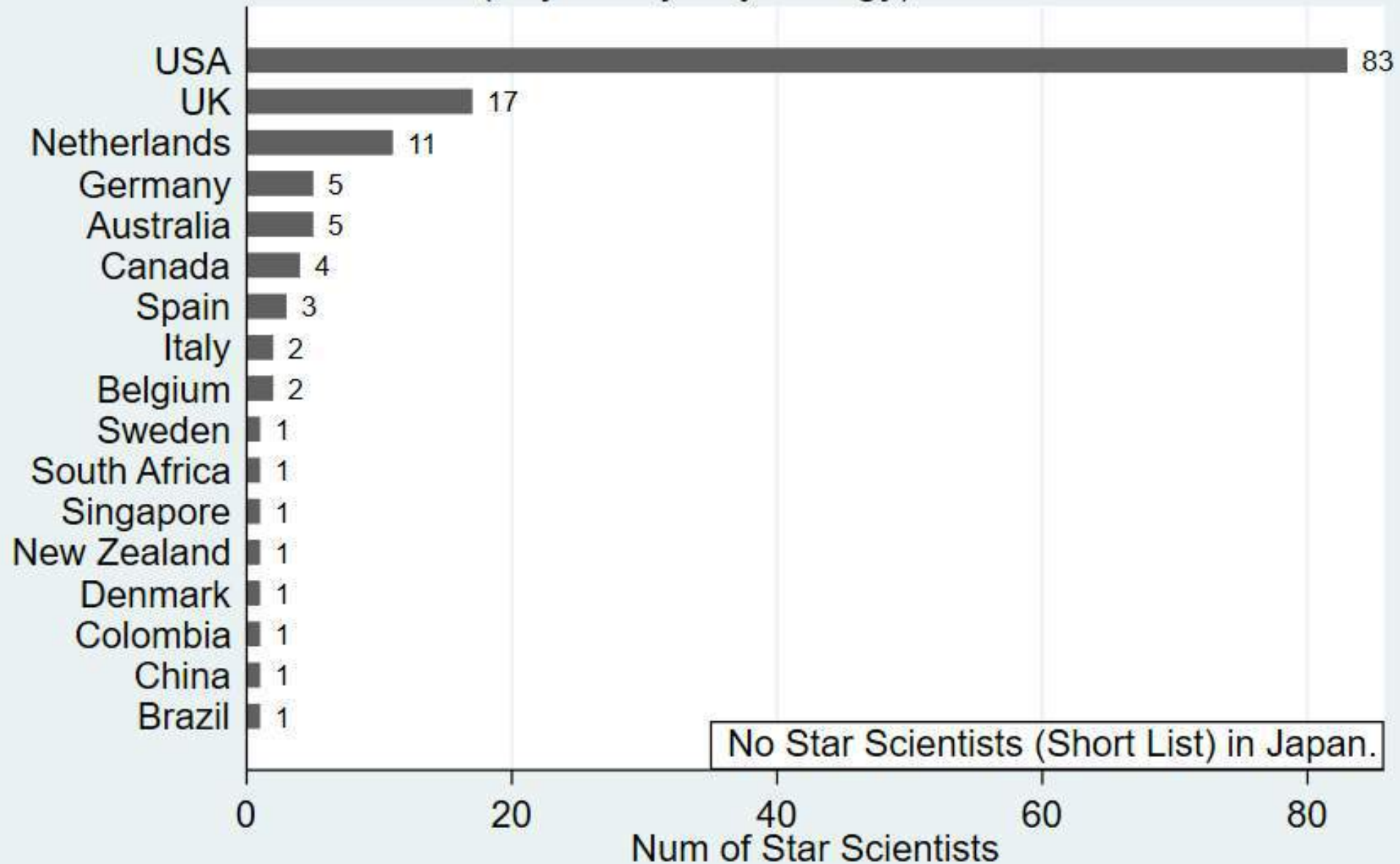
Ranking of Countries by Num of Star Scientists(Short List) (Physics)



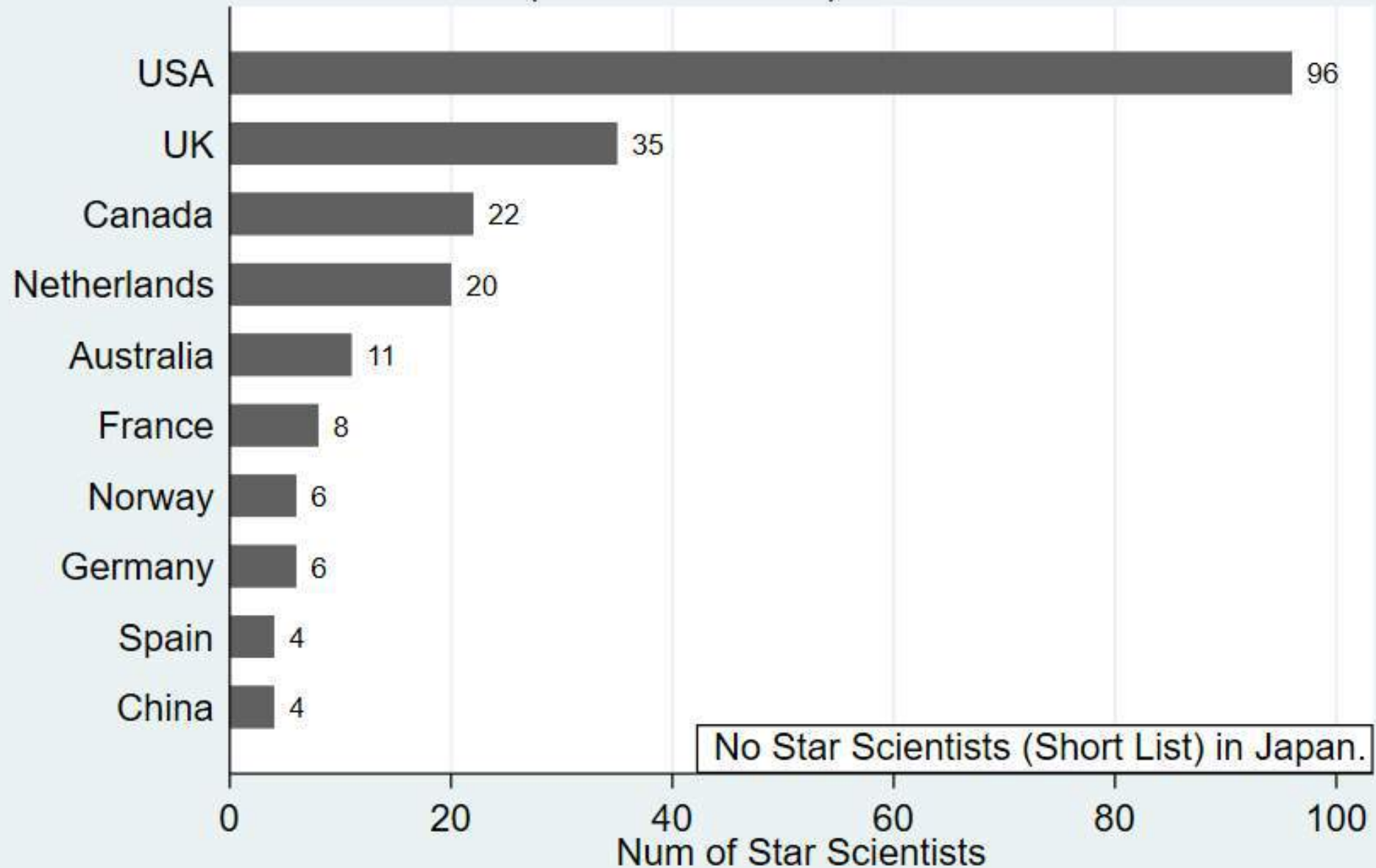
Ranking of Countries by Num of Star Scientists (Short List) (Plant & Animal Science)



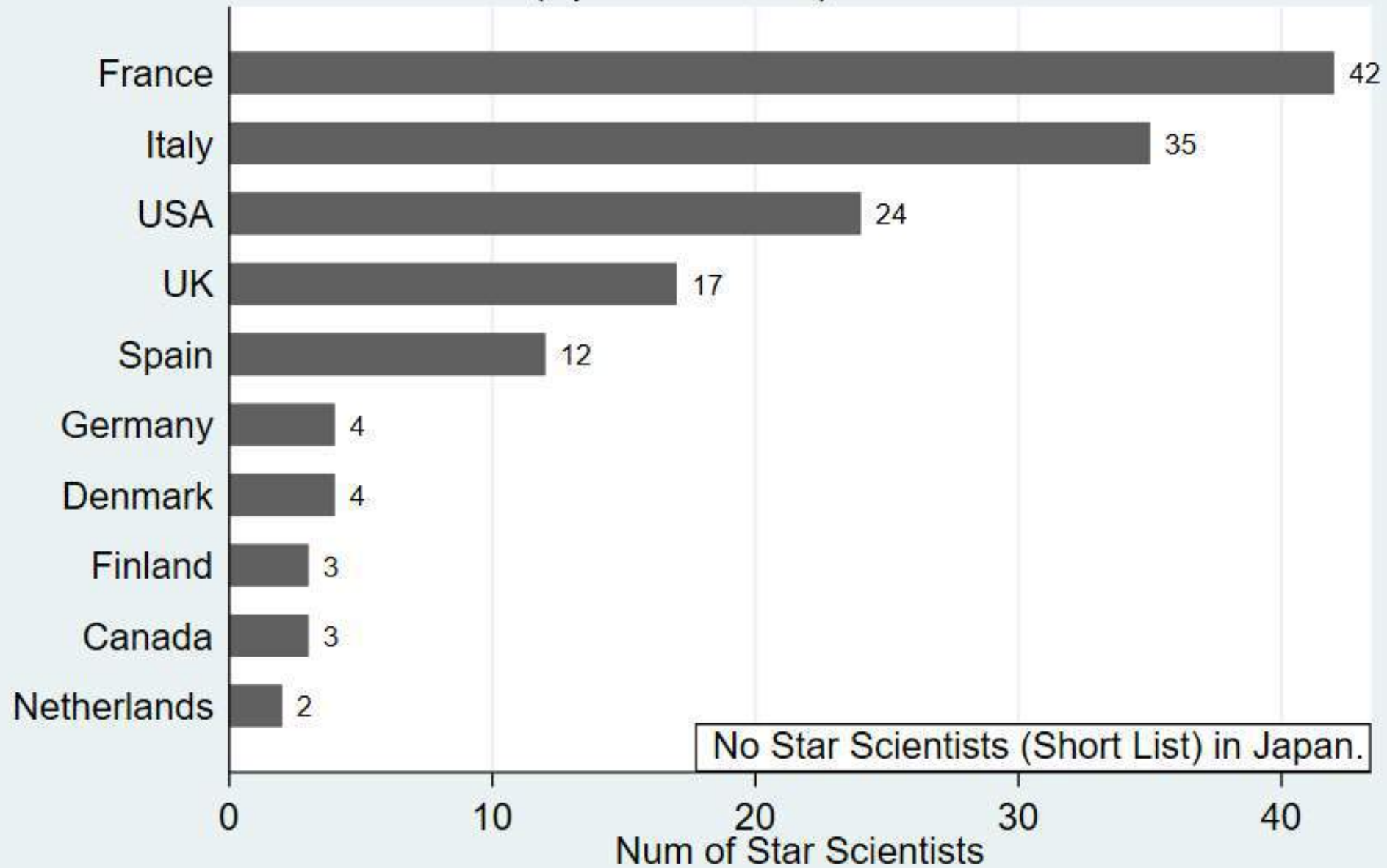
Ranking of Countries by Num of Star Scientists(Short List) (Psychiatry/Psychology)



Ranking of Countries by Num of Star Scientists (Short List) (Social Sciences)

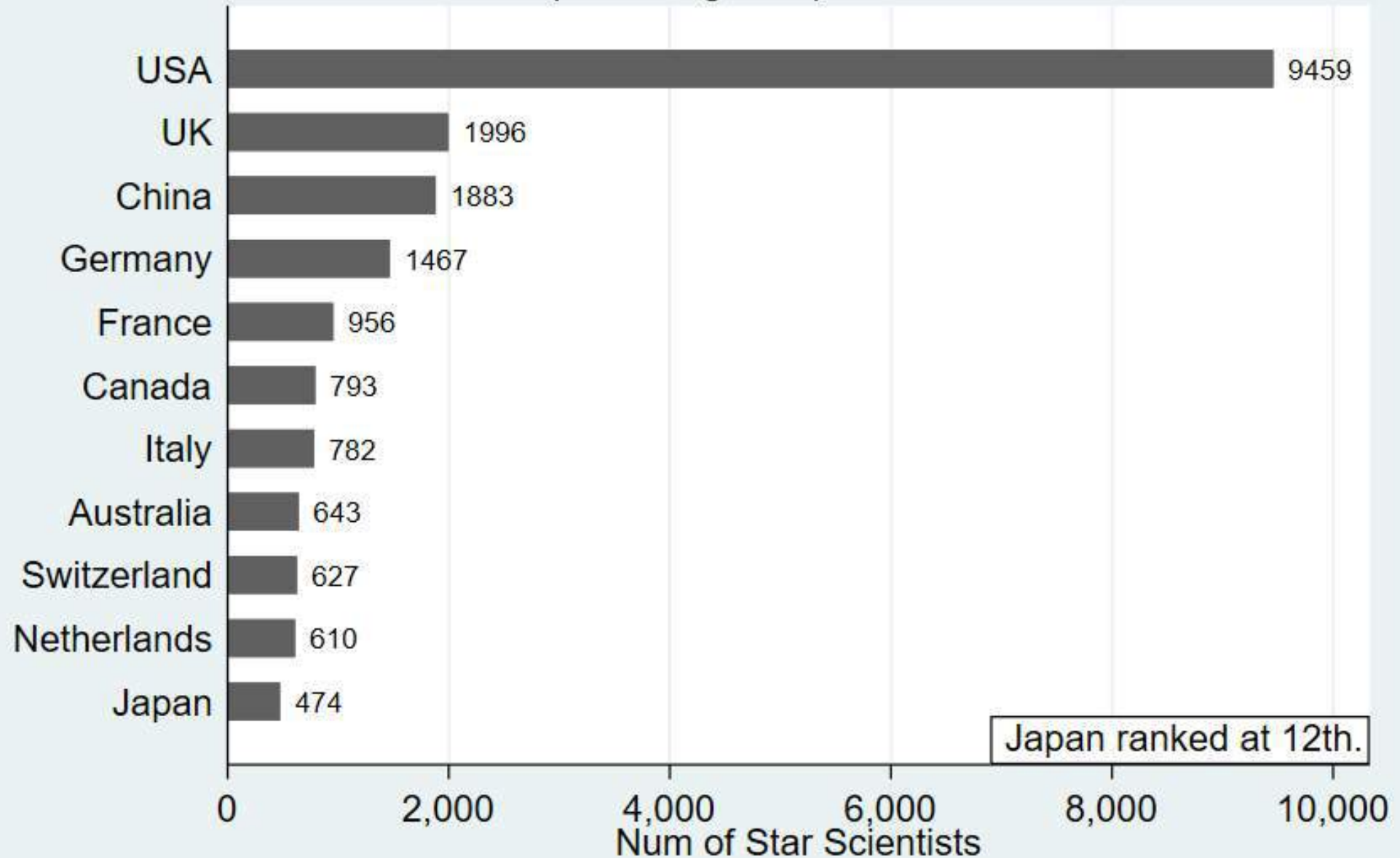


Ranking of Countries by Num of Star Scientists (Short List) (Space Science)

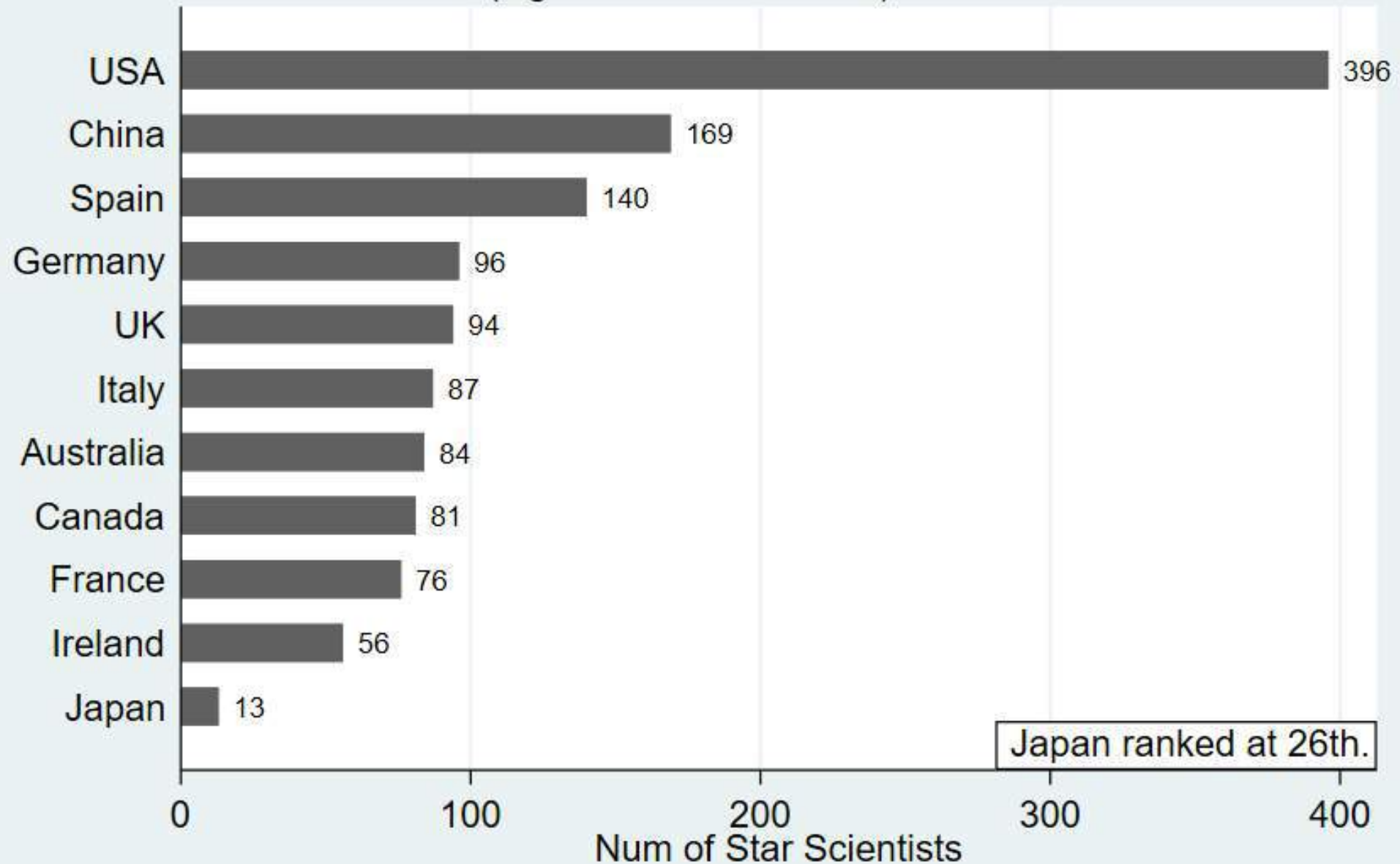


1-2. Ranking of Countries by Num of Star Scientists(Long List)

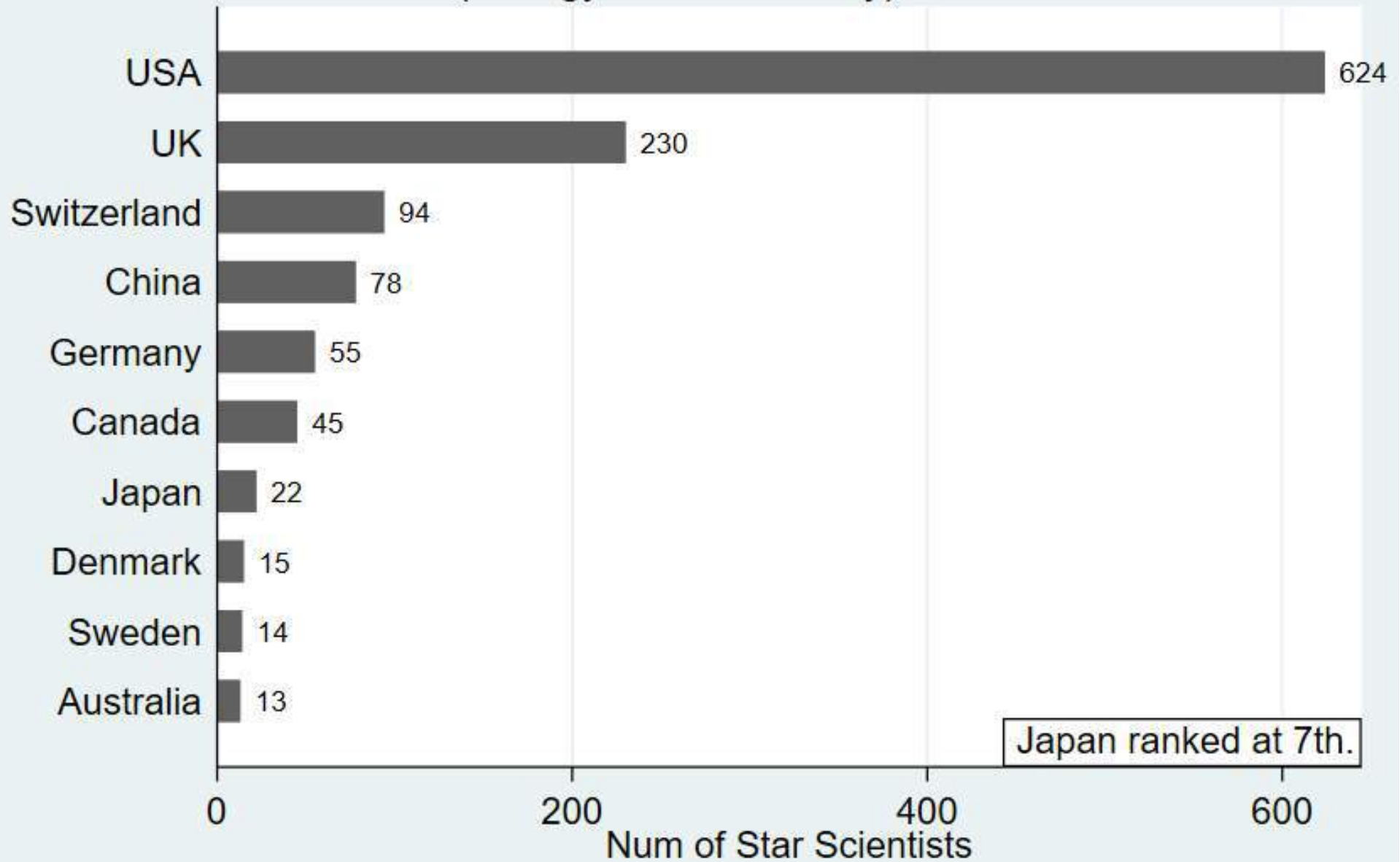
Ranking of Countries by Num of Star Scientists(Long List) (All Categories)



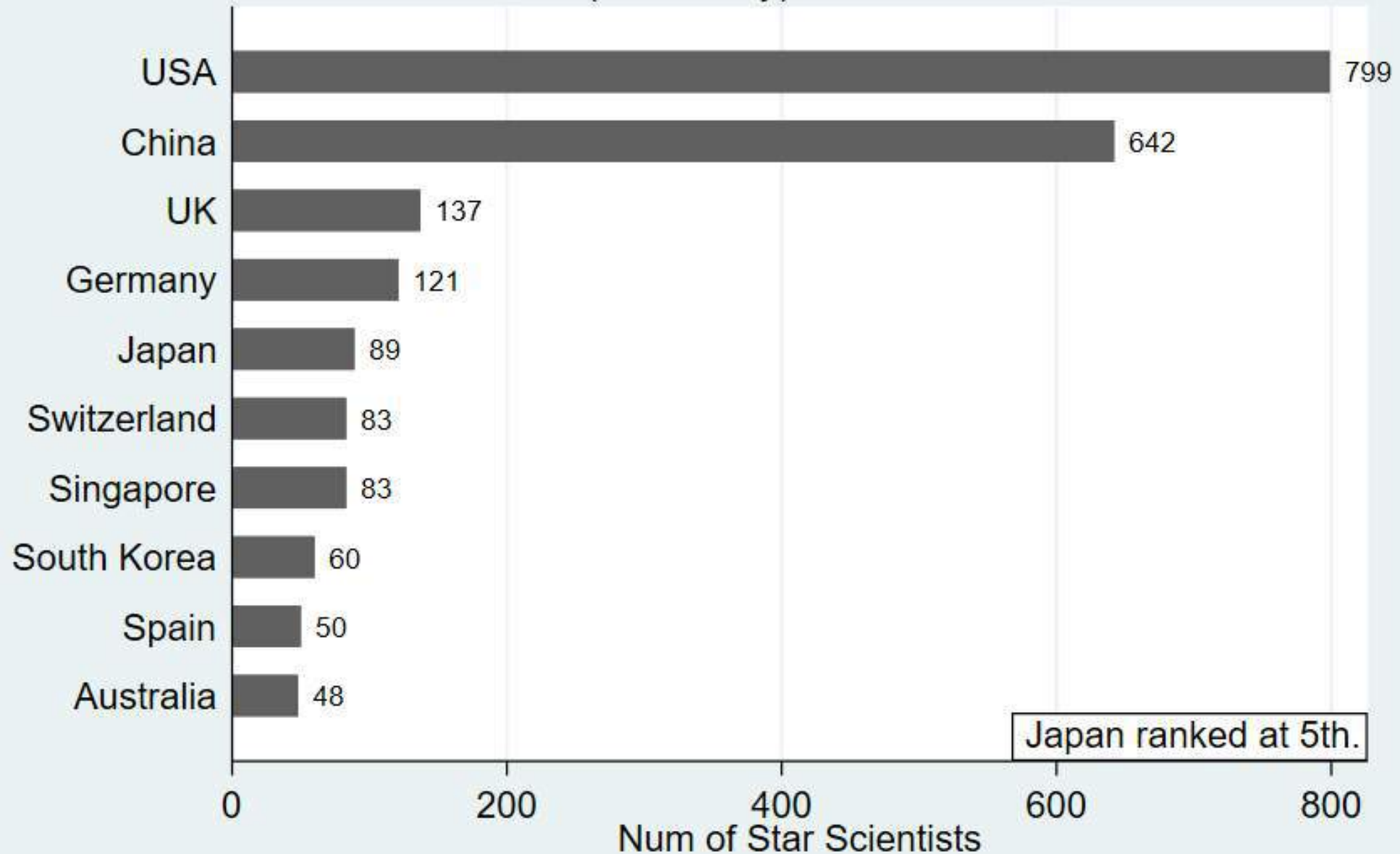
Ranking of Countries by Num of Star Scientists(Long List) (Agricultural Sciences)



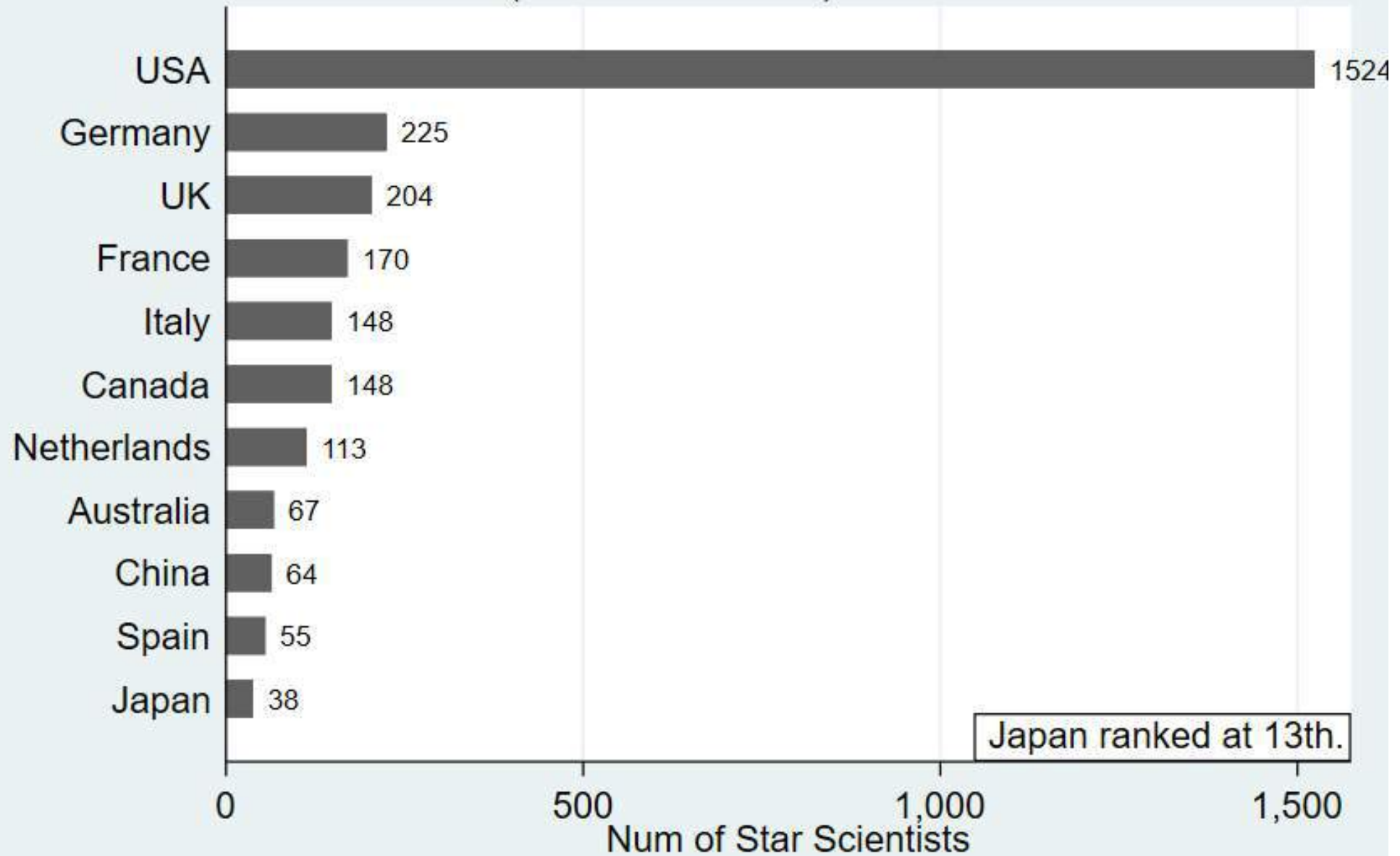
Ranking of Countries by Num of Star Scientists(Long List) (Biology & Biochemistry)



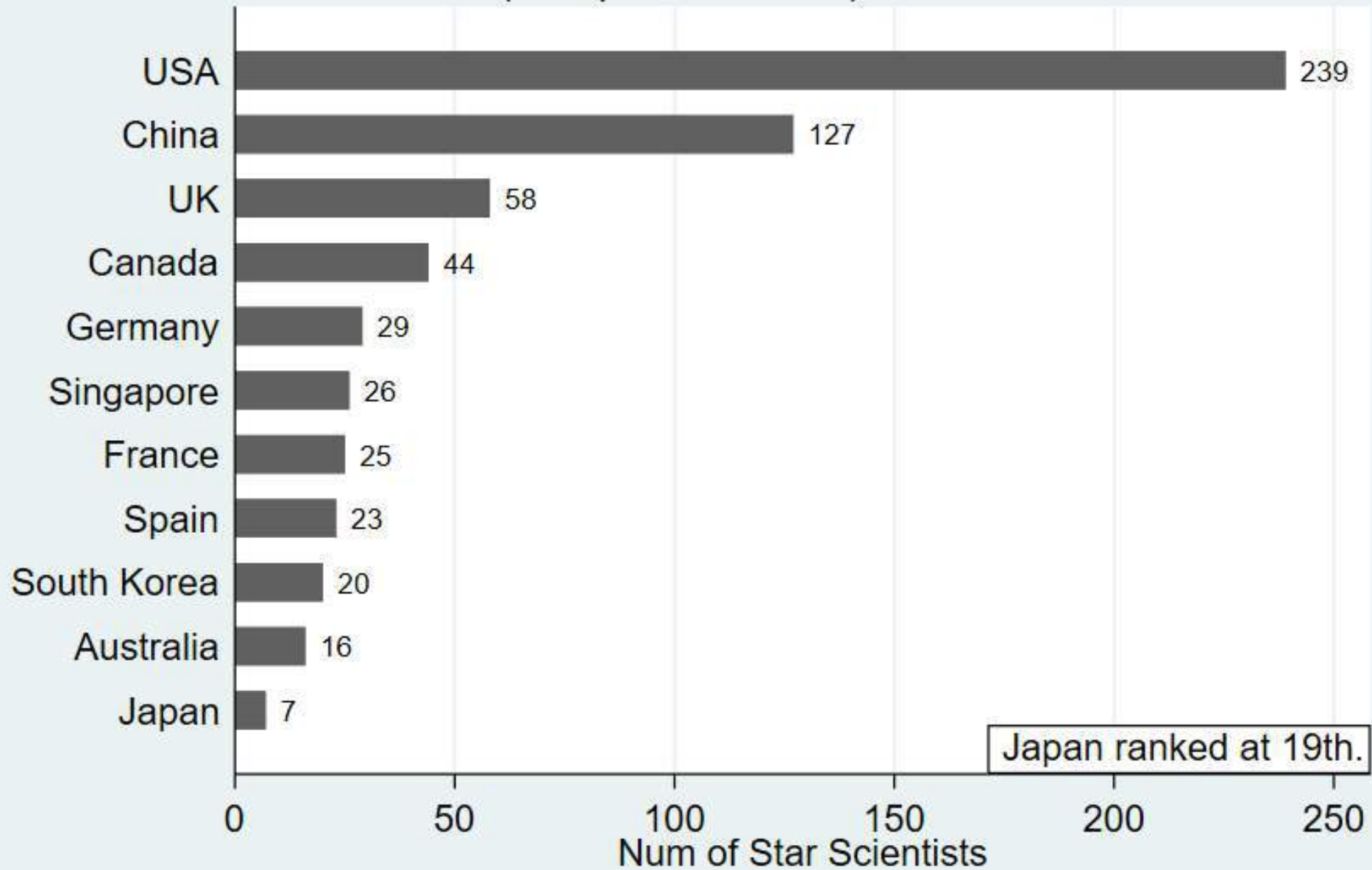
Ranking of Countries by Num of Star Scientists(Long List) (Chemistry)



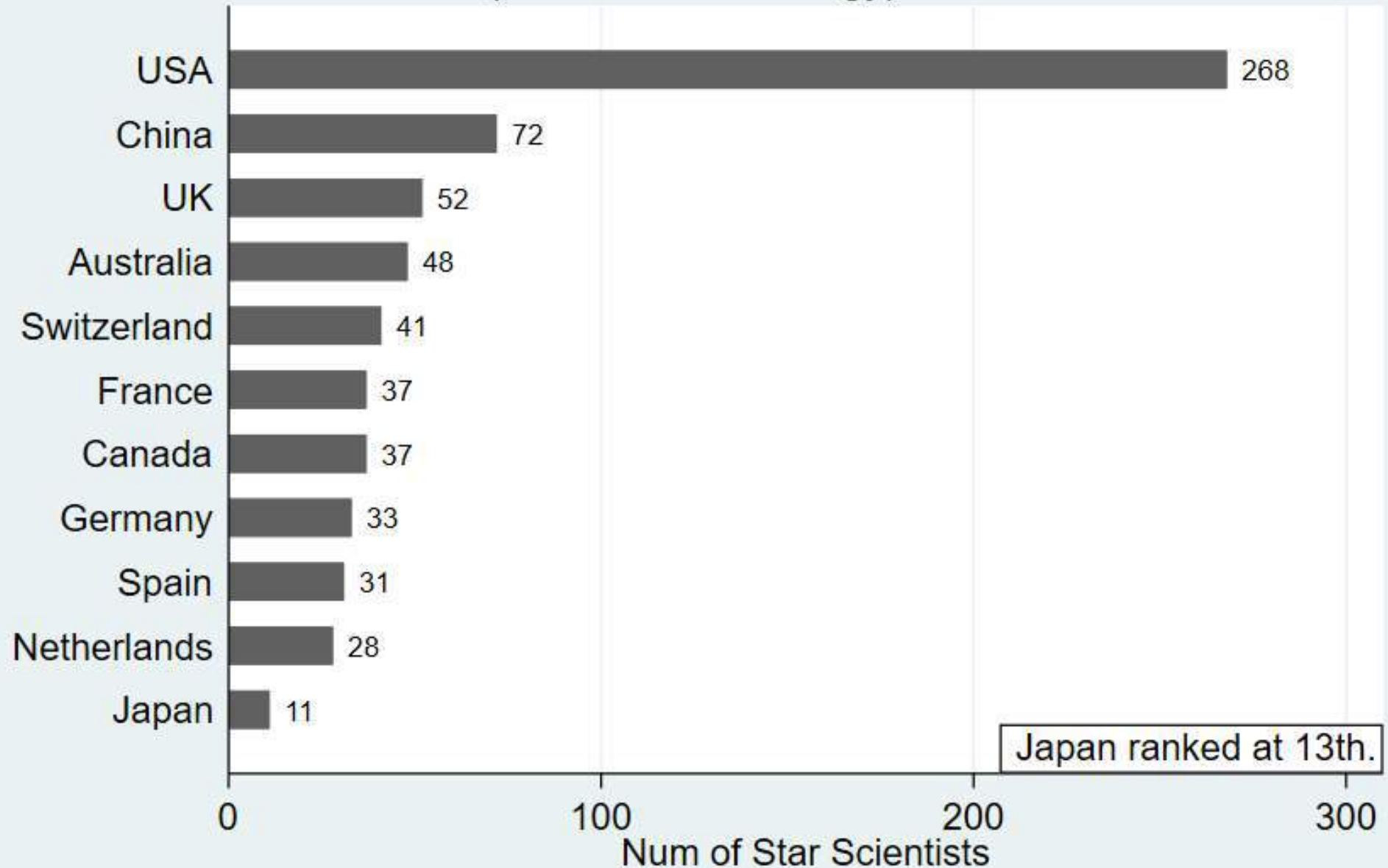
Ranking of Countries by Num of Star Scientists(Long List) (Clinical Medicine)



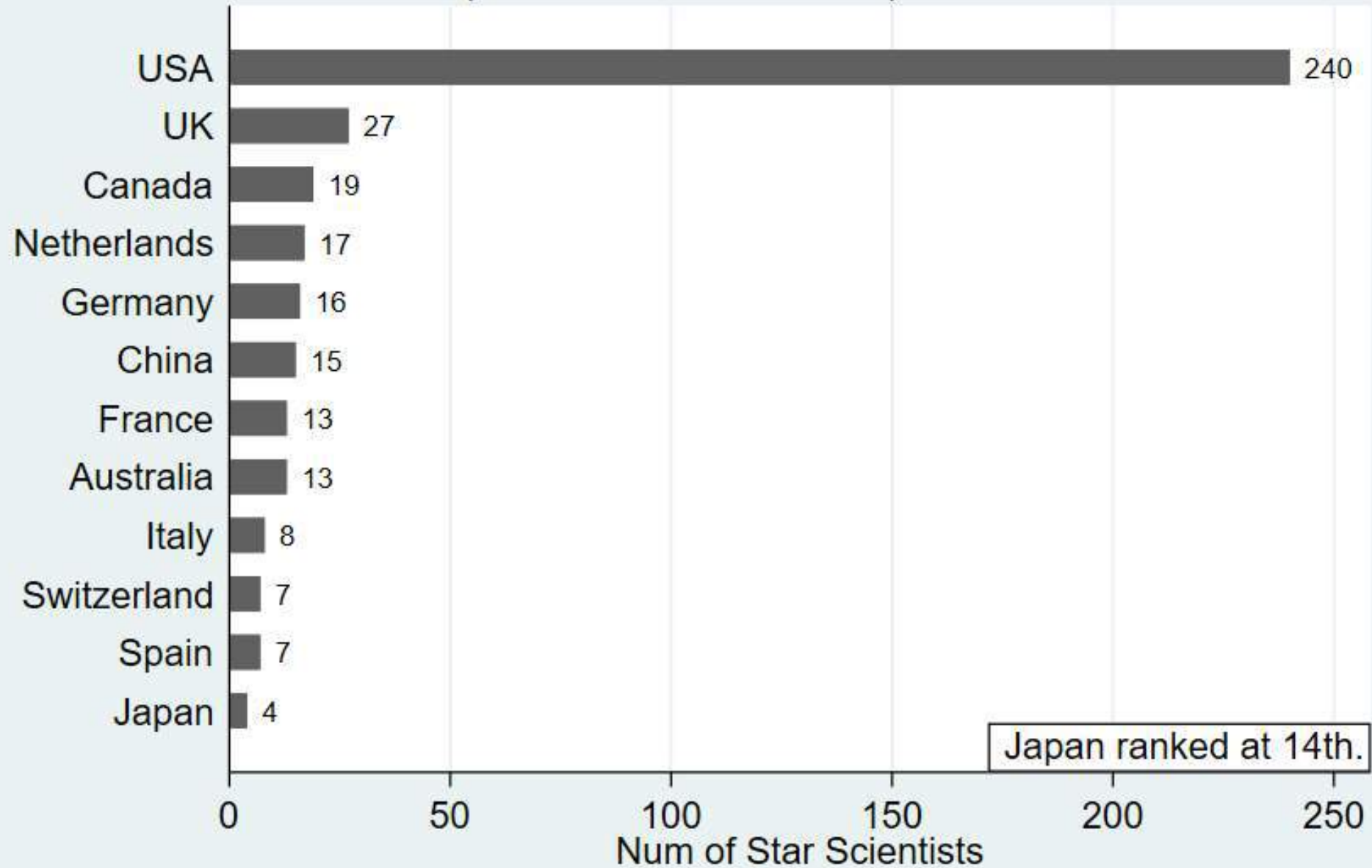
Ranking of Countries by Num of Star Scientists(Long List) (Computer Science)



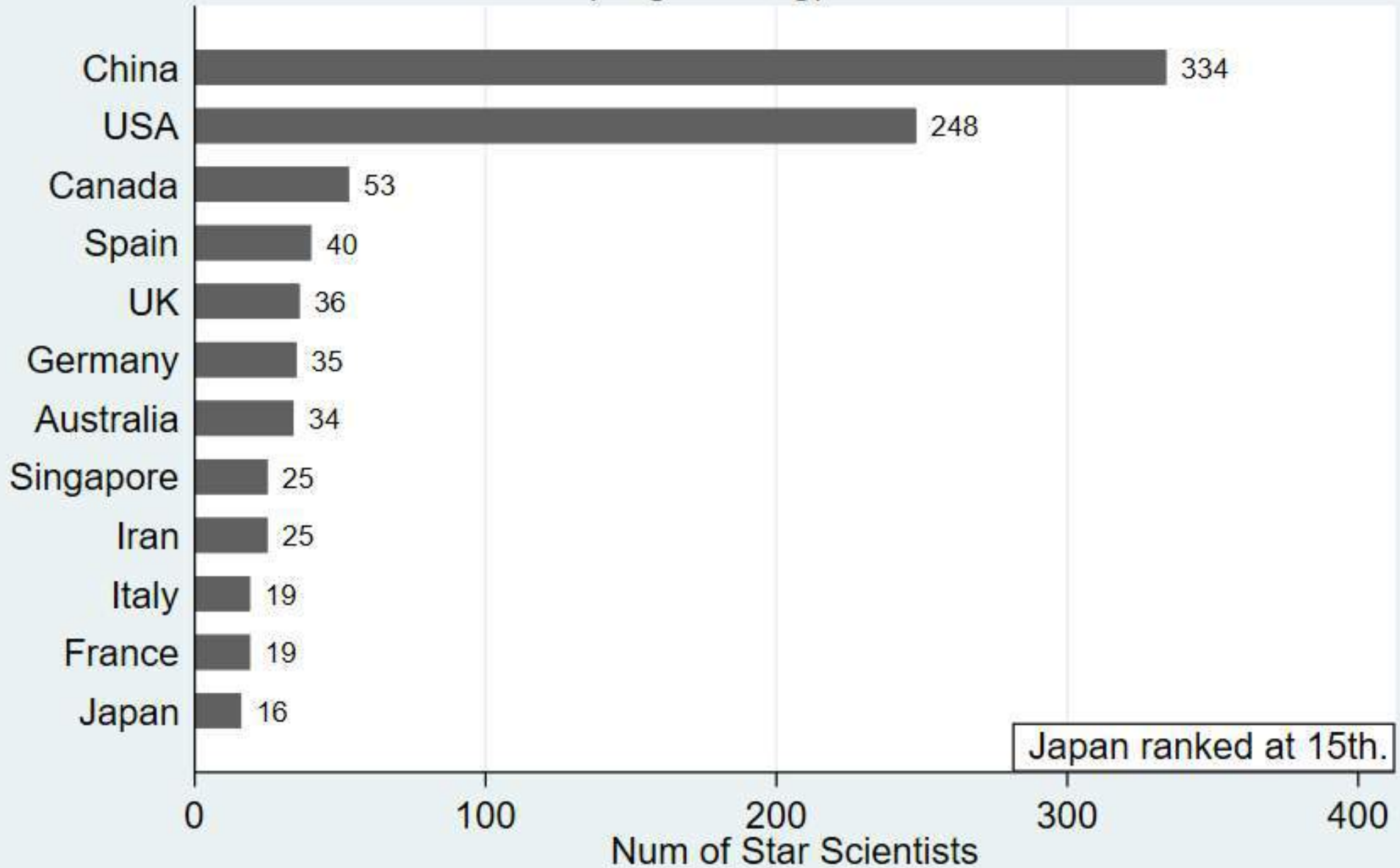
Ranking of Countries by Num of Star Scientists(Long List) (Environment/Ecology)



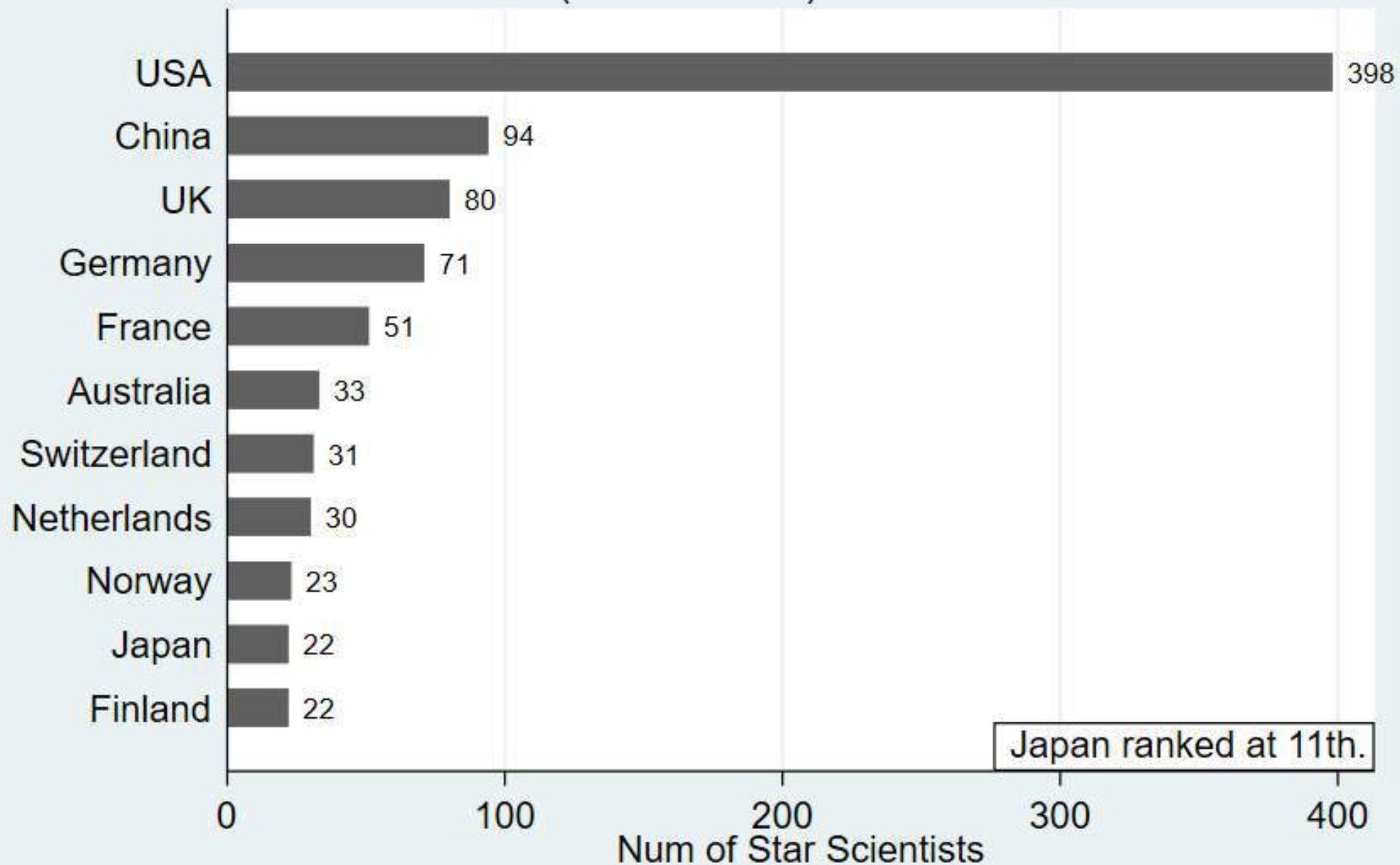
Ranking of Countries by Num of Star Scientists(Long List) (Economics & Business)



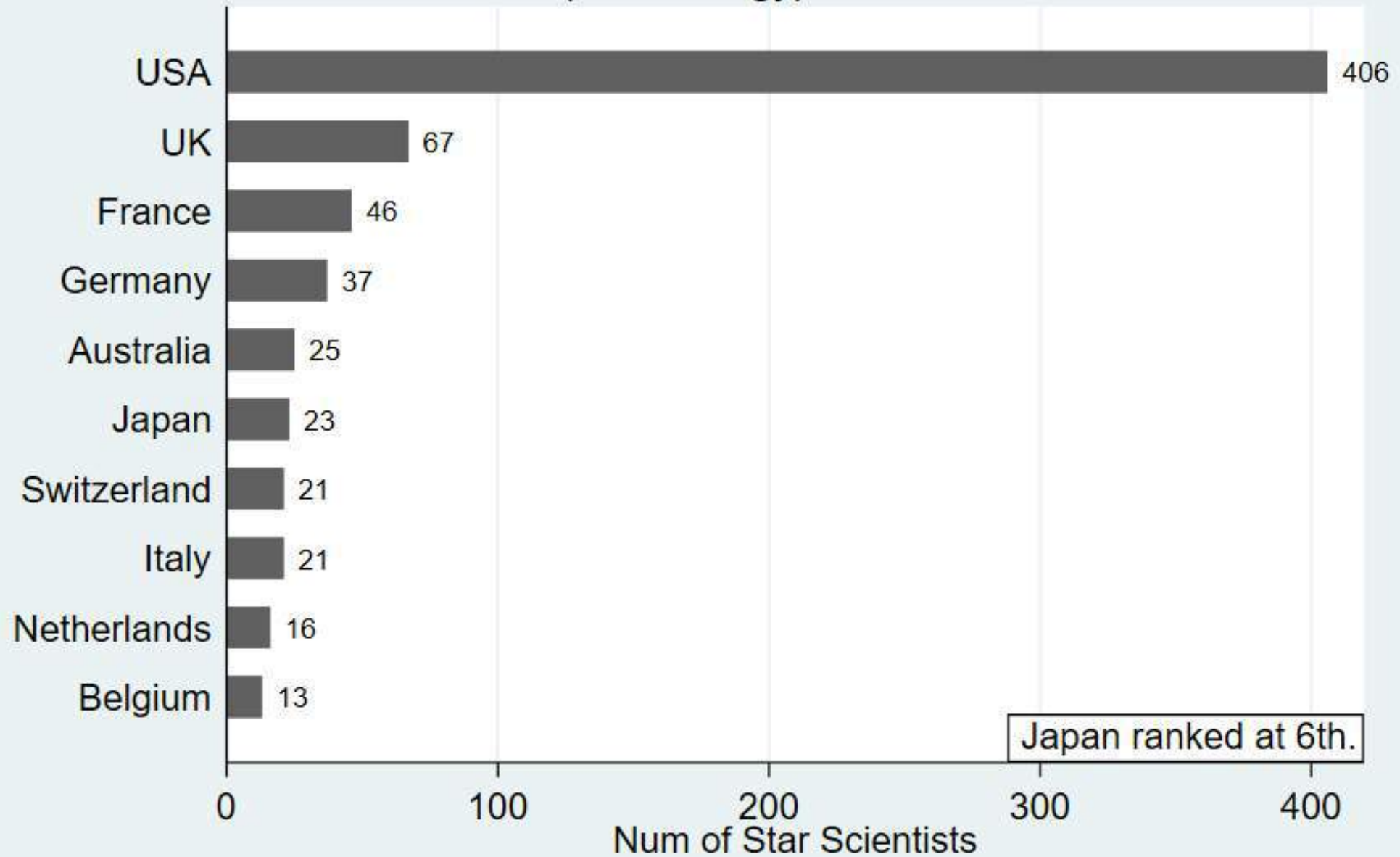
Ranking of Countries by Num of Star Scientists(Long List) (Engineering)



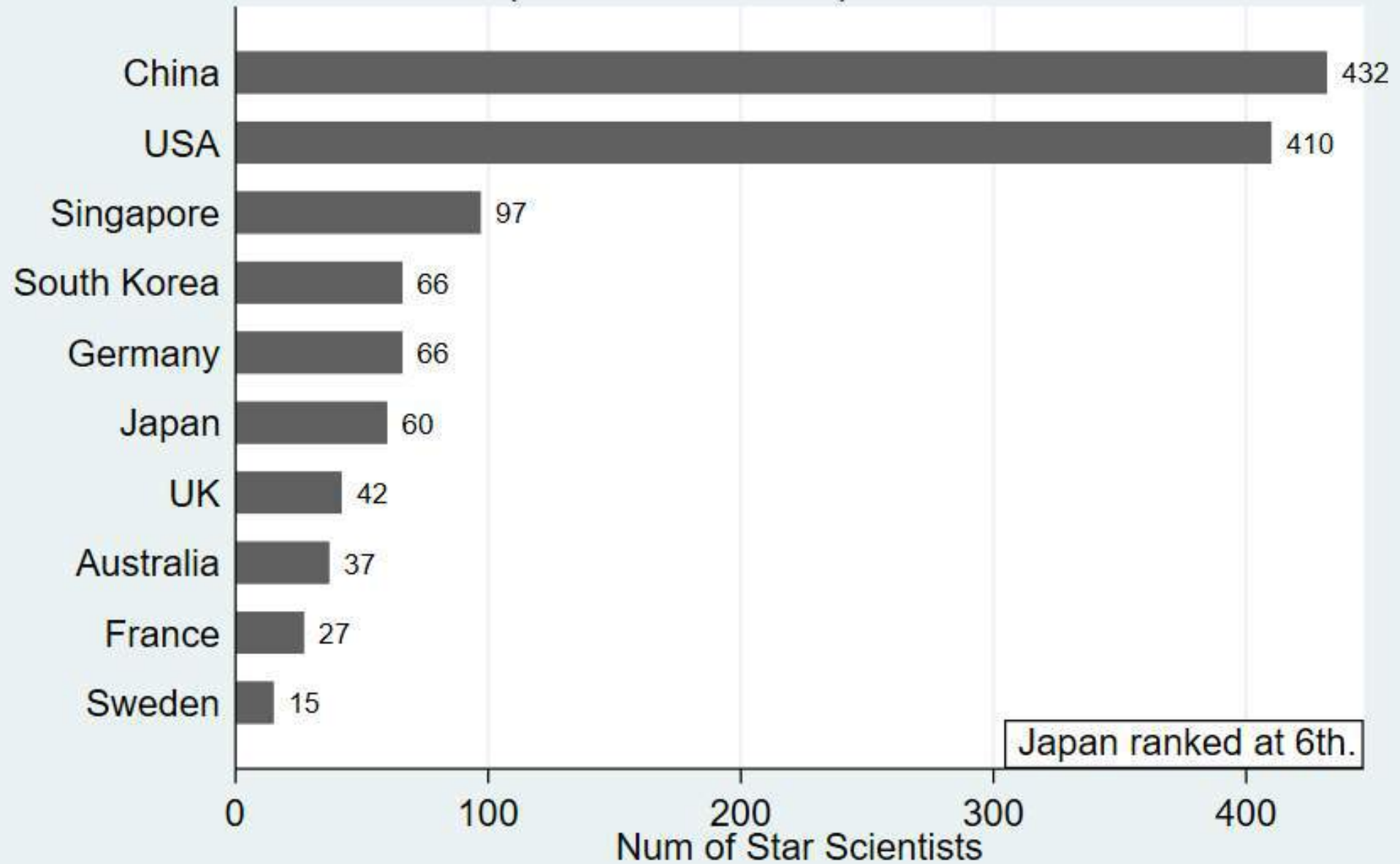
Ranking of Countries by Num of Star Scientists(Long List) (Geosciences)



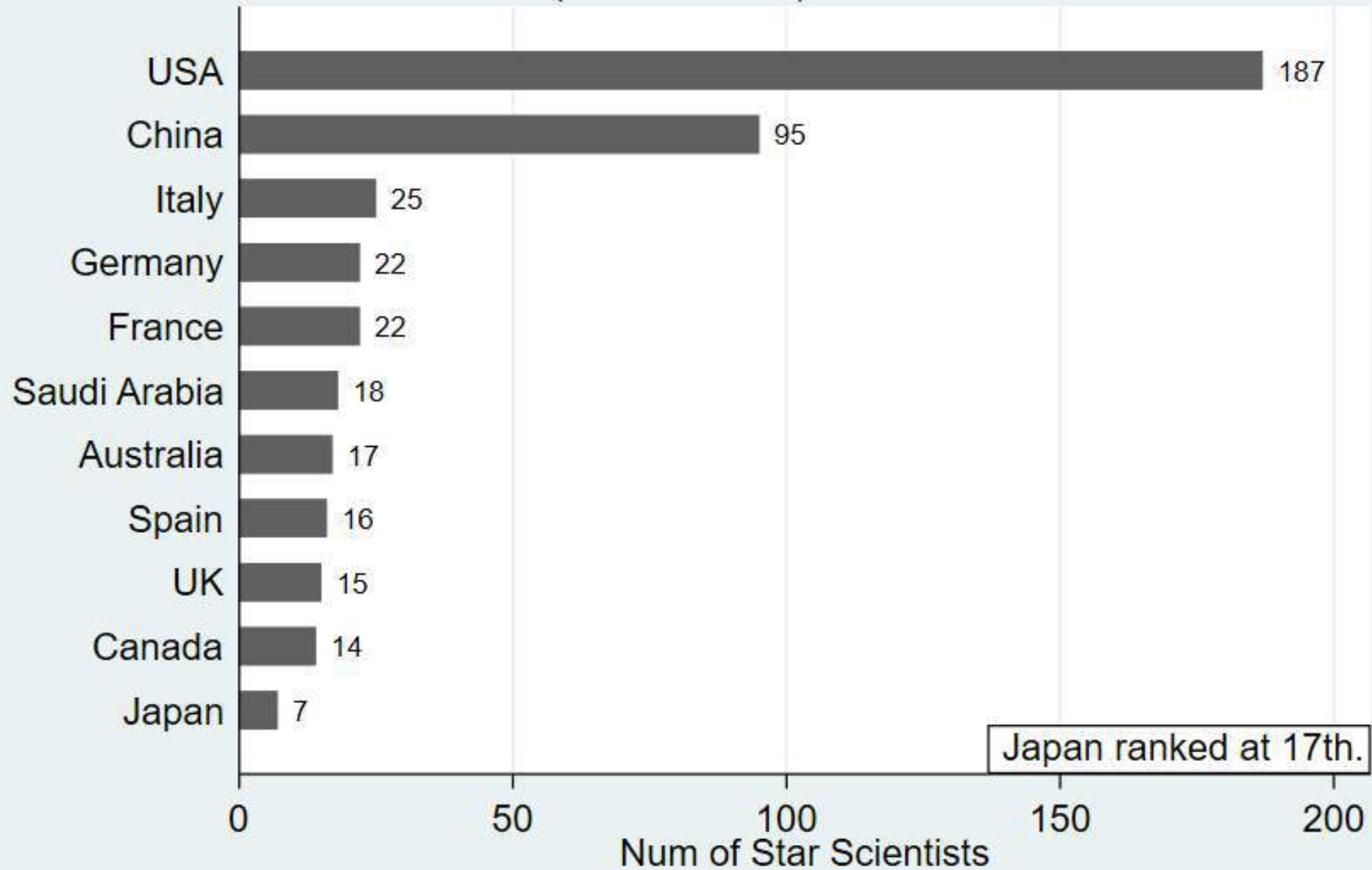
Ranking of Countries by Num of Star Scientists(Long List) (Immunology)



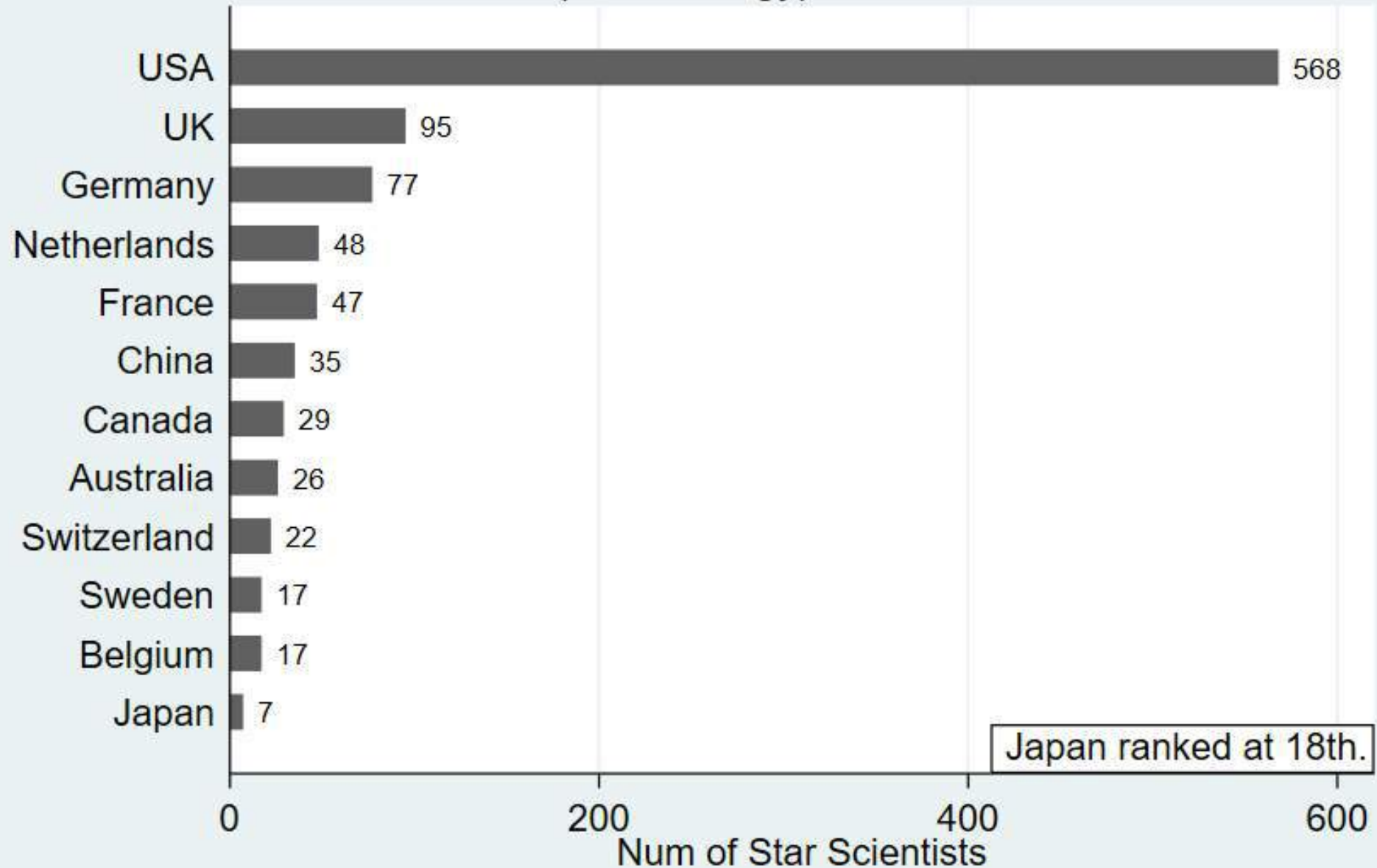
Ranking of Countries by Num of Star Scientists(Long List) (Materials Science)



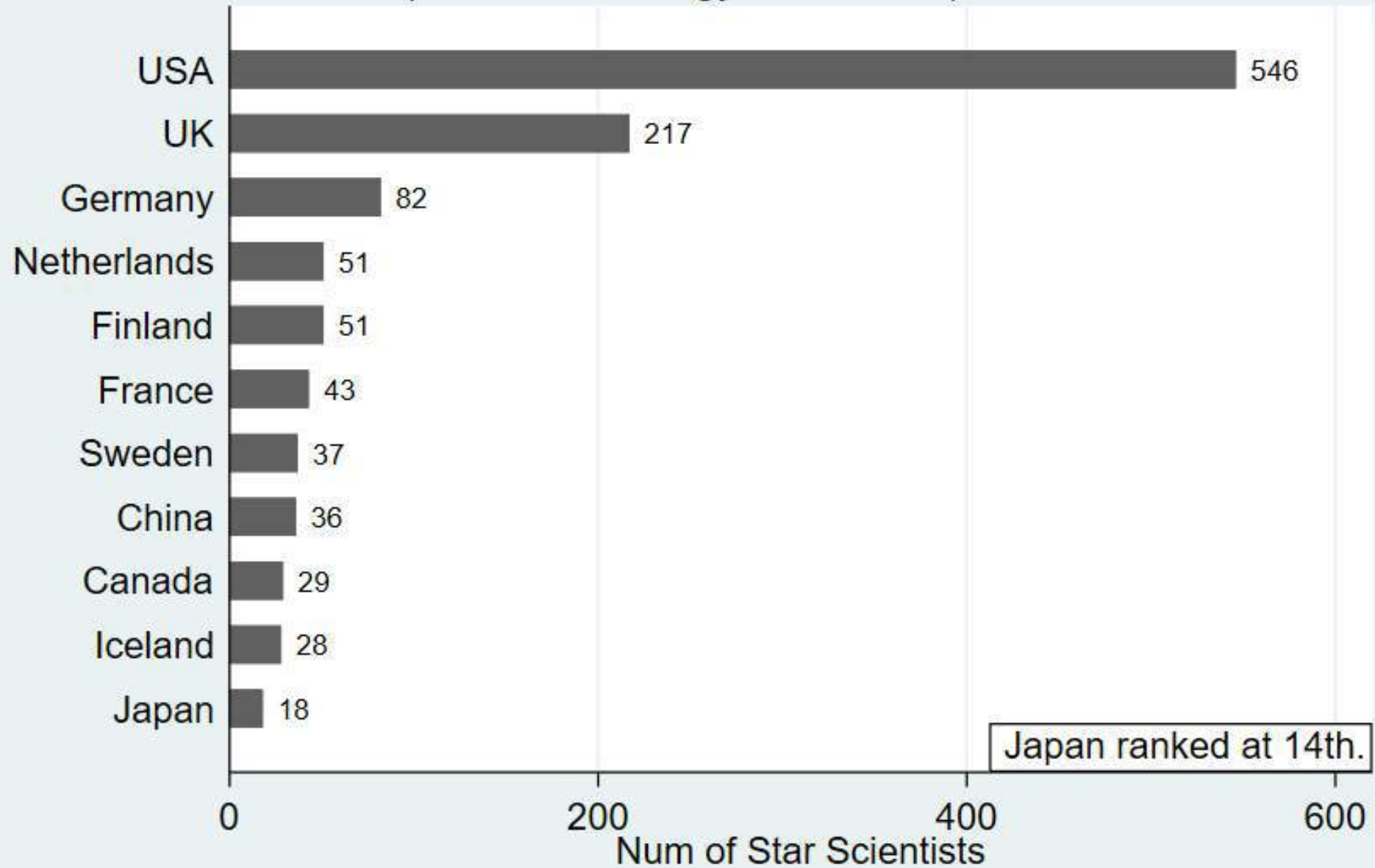
Ranking of Countries by Num of Star Scientists(Long List) (Mathematics)



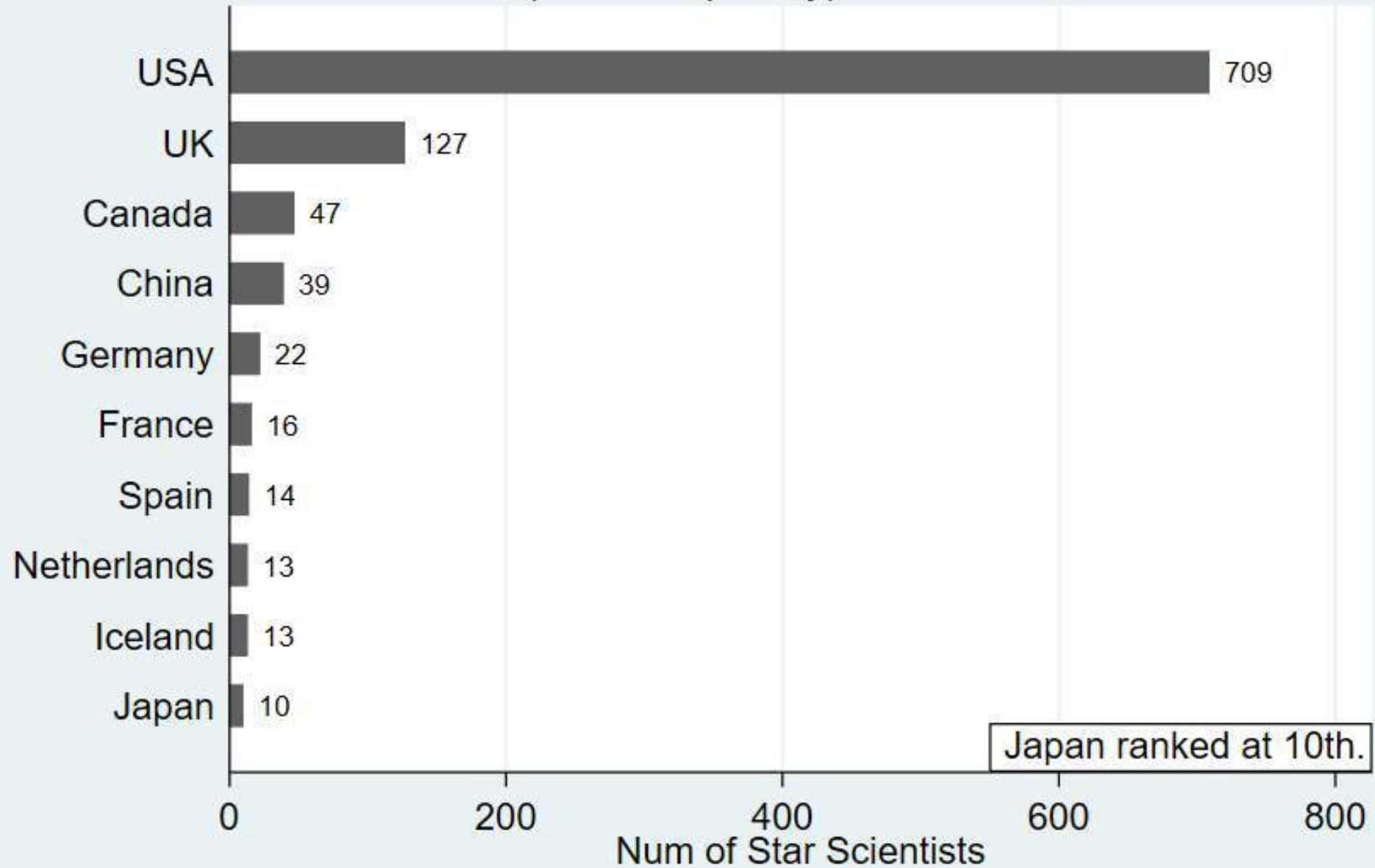
Ranking of Countries by Num of Star Scientists(Long List) (Microbiology)



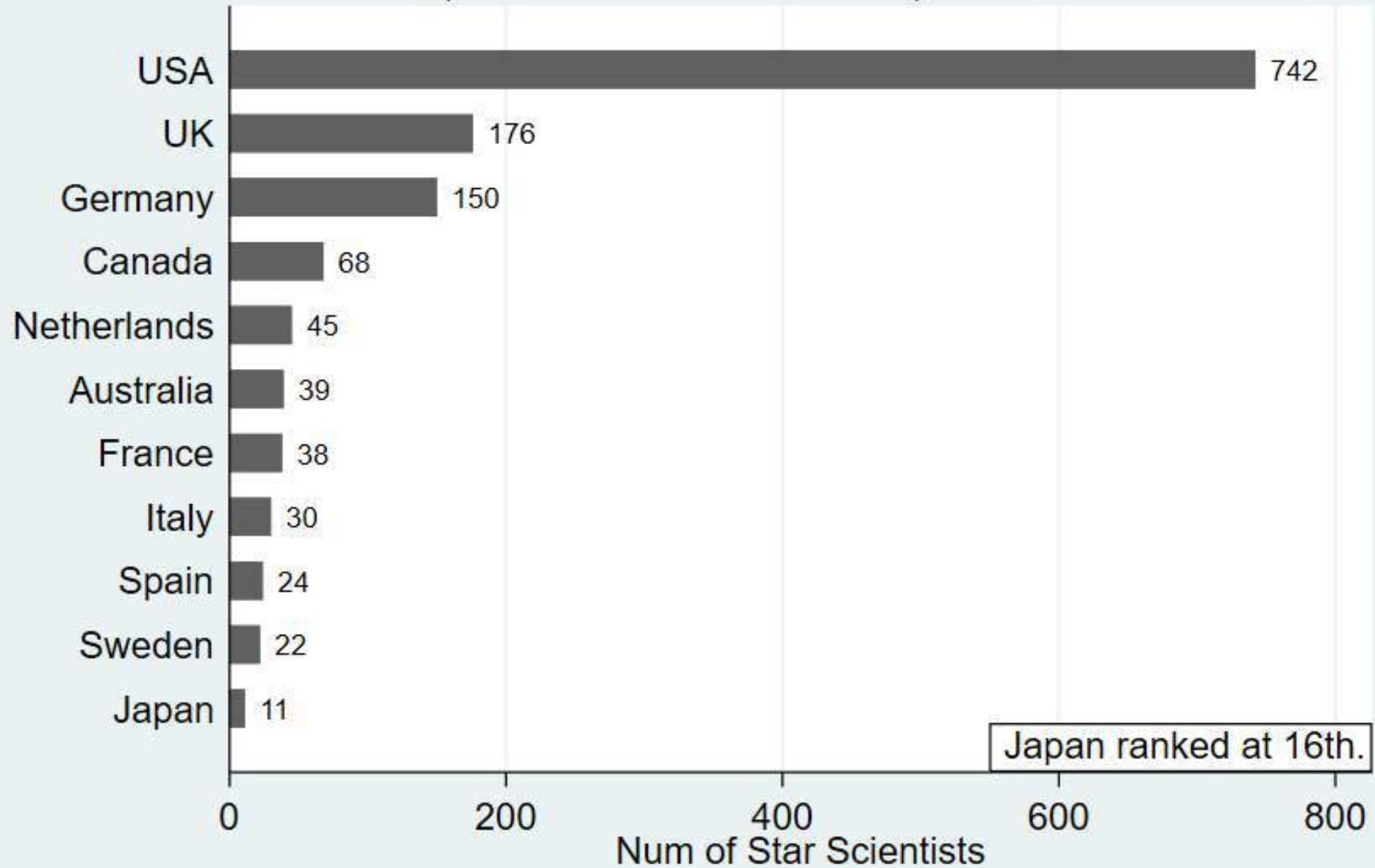
Ranking of Countries by Num of Star Scientists(Long List) (Molecular Biology & Genetics)



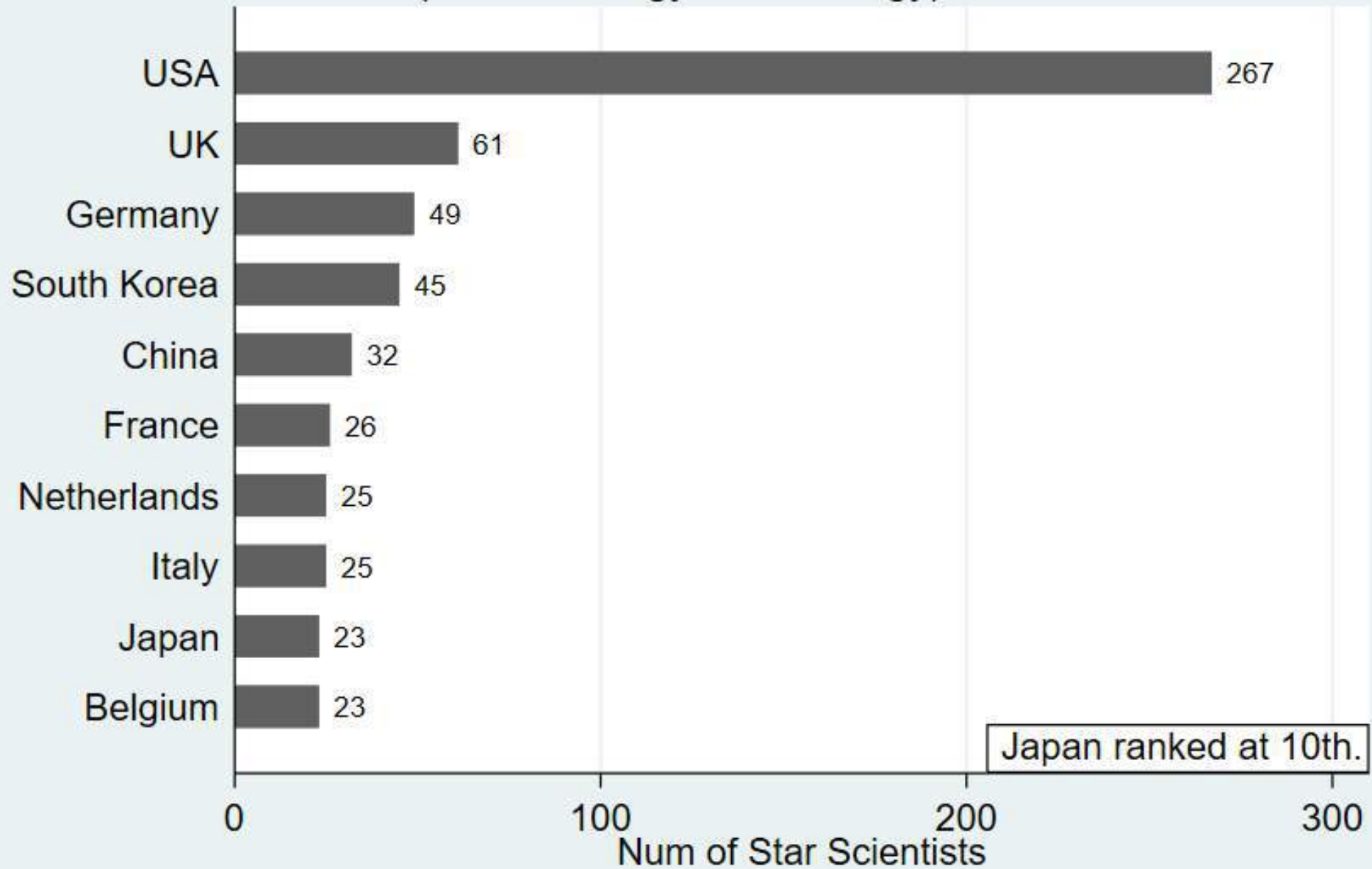
Ranking of Countries by Num of Star Scientists(Long List) (Multidisciplinary)



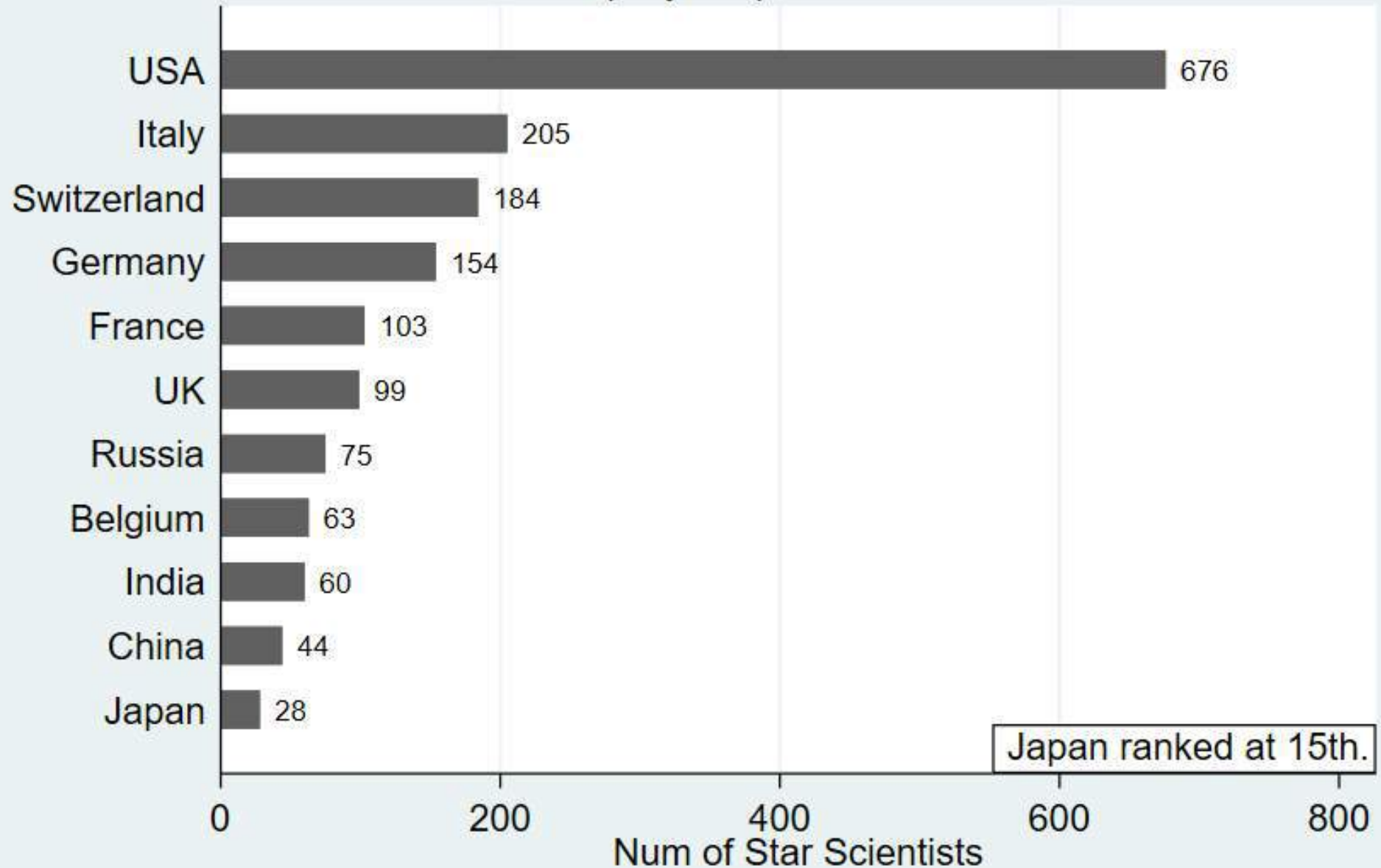
Ranking of Countries by Num of Star Scientists(Long List) (Neuroscience & Behavior)



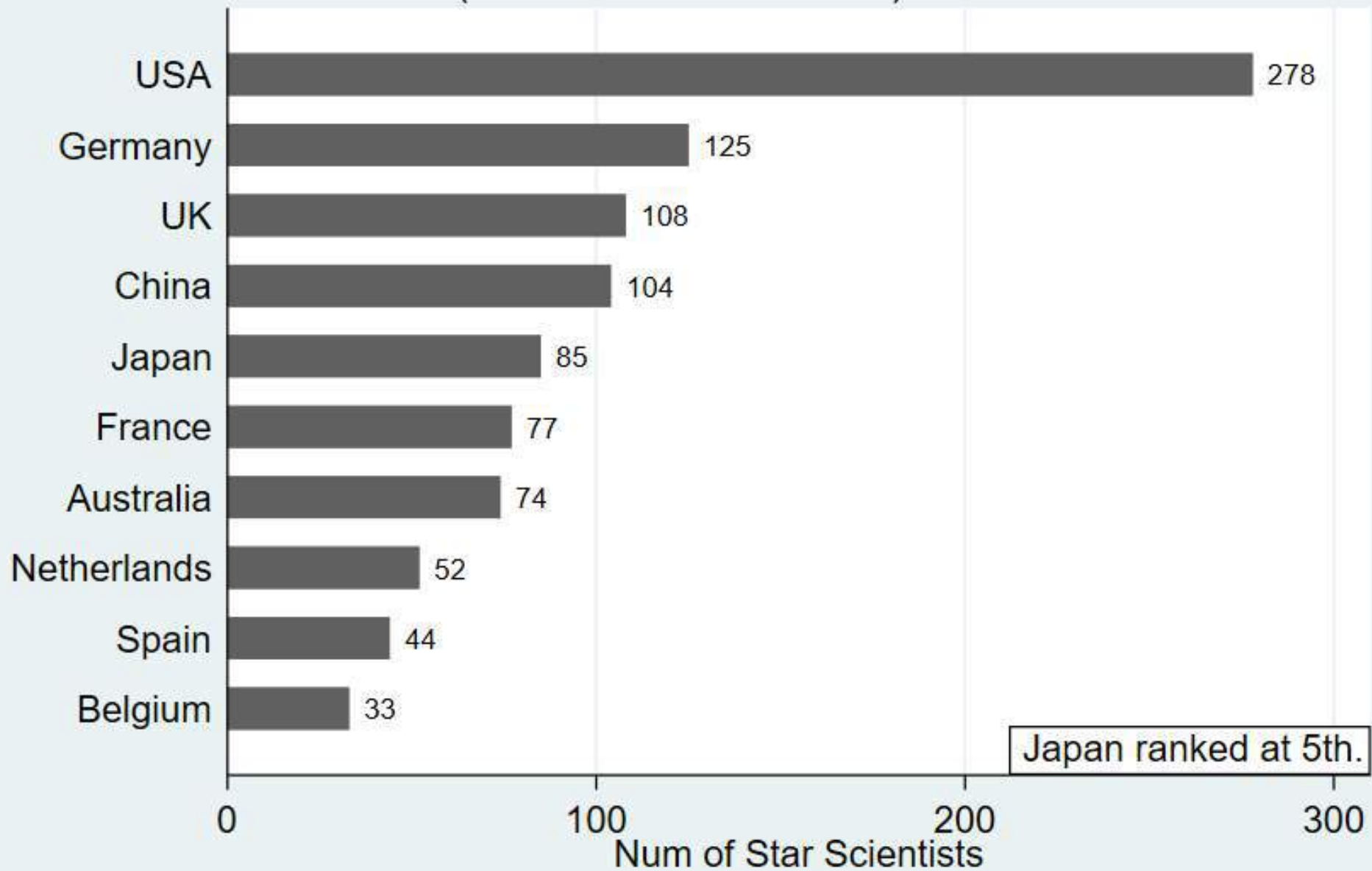
Ranking of Countries by Num of Star Scientists(Long List) (Pharmacology & Toxicology)



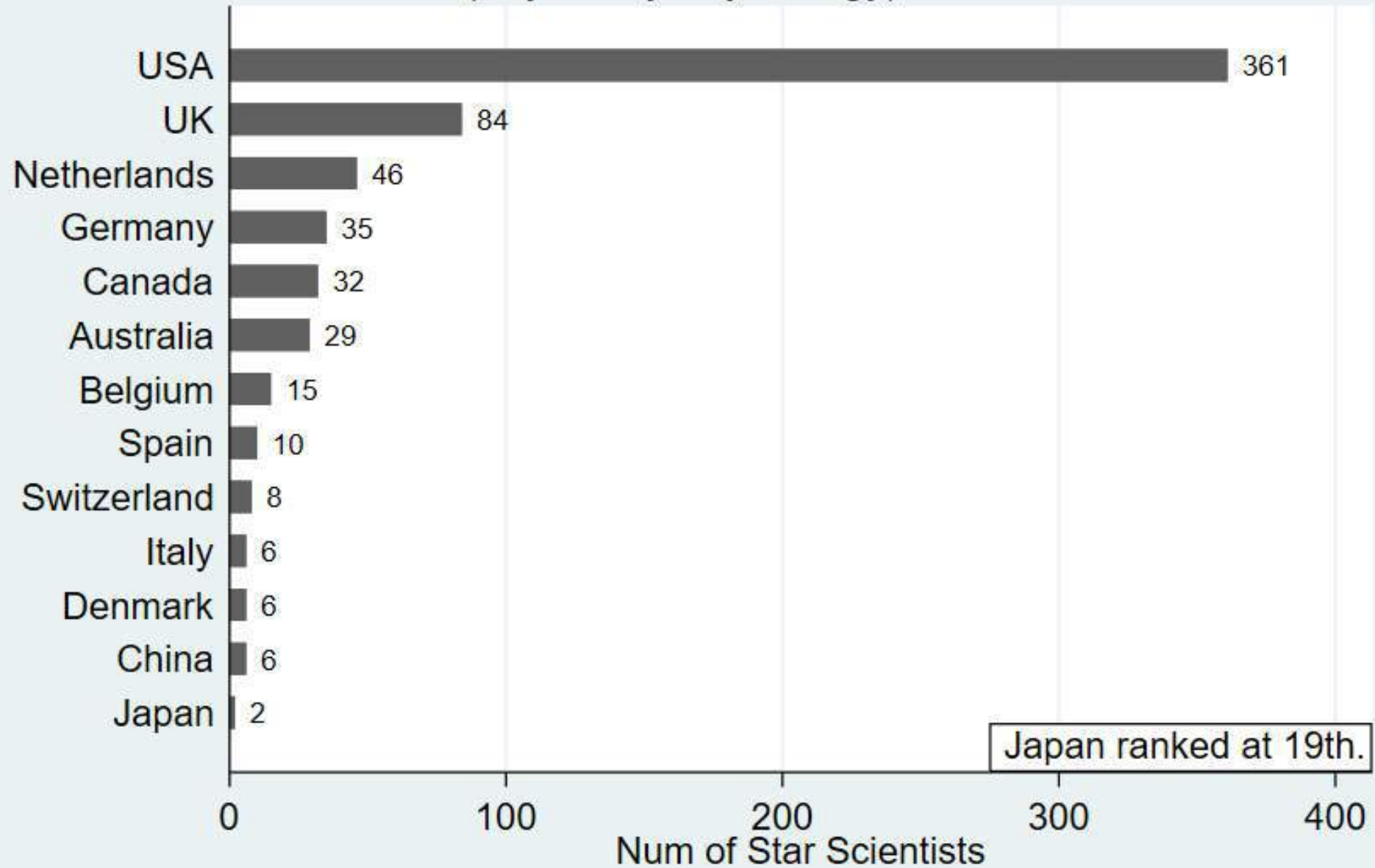
Ranking of Countries by Num of Star Scientists(Long List) (Physics)



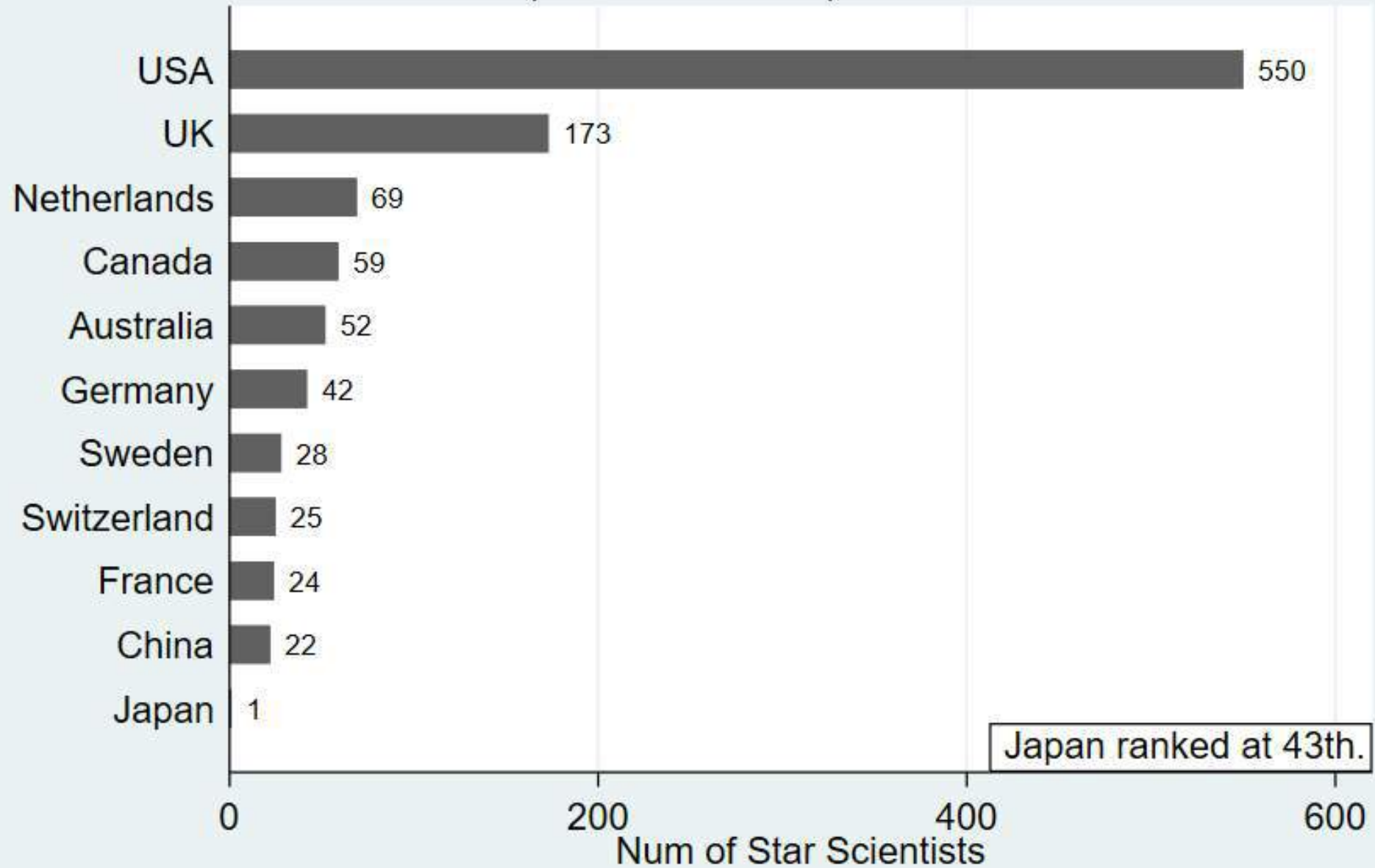
Ranking of Countries by Num of Star Scientists(Long List) (Plant & Animal Science)



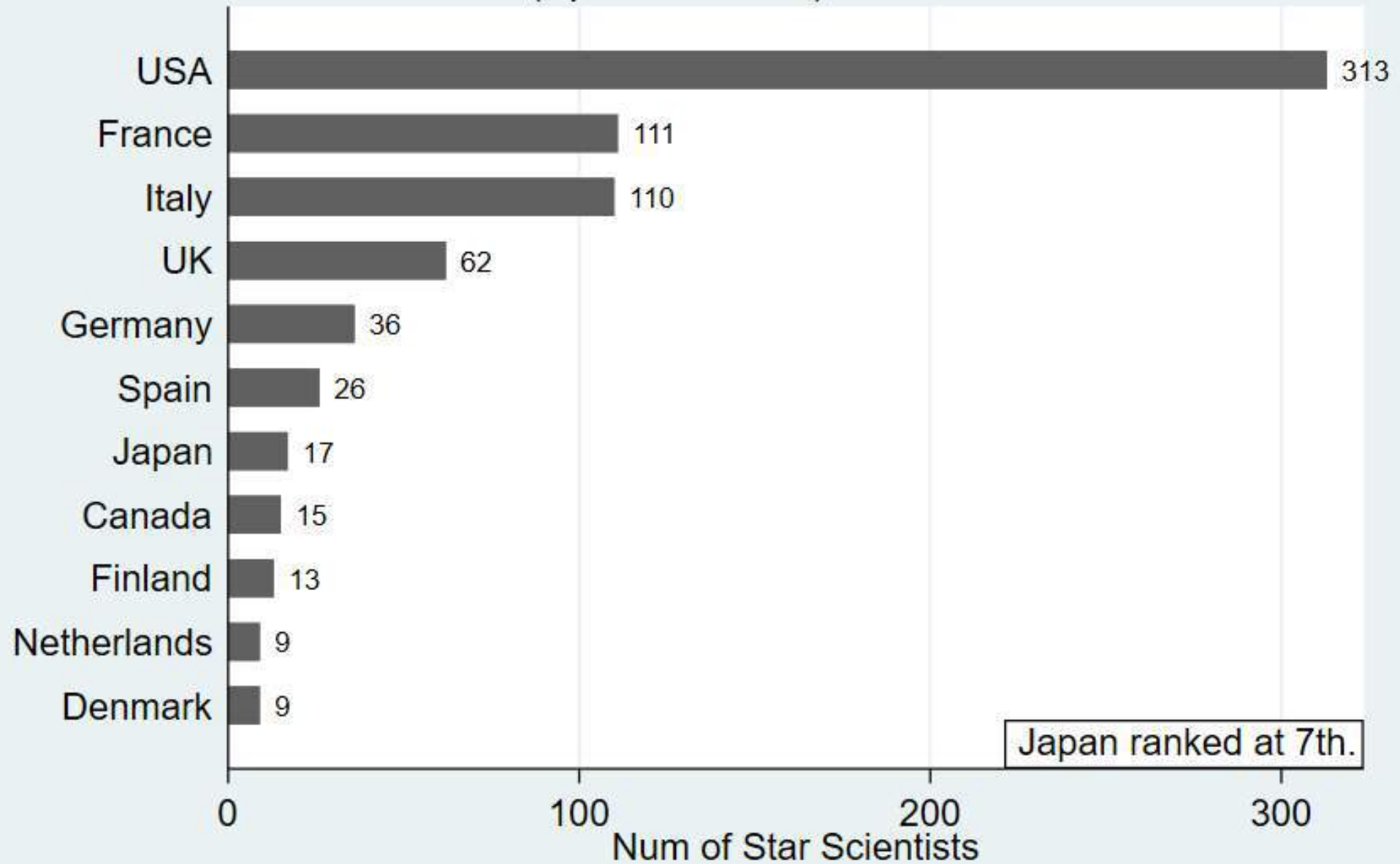
Ranking of Countries by Num of Star Scientists(Long List) (Psychiatry/Psychology)



Ranking of Countries by Num of Star Scientists(Long List) (Social Sciences)



Ranking of Countries by Num of Star Scientists(Long List) (Space Science)

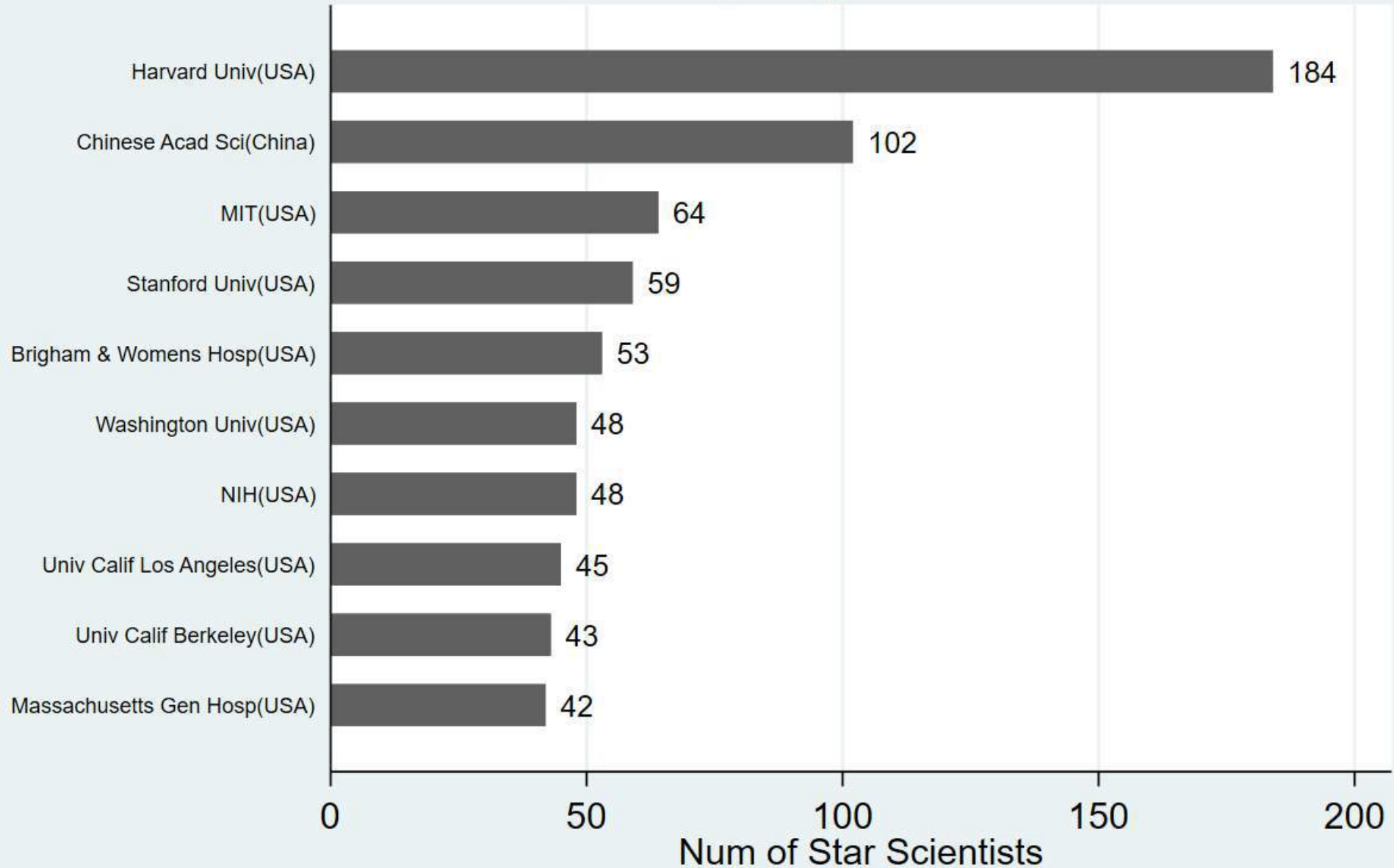


2. Ranking of Organizations by # of Star Scientists

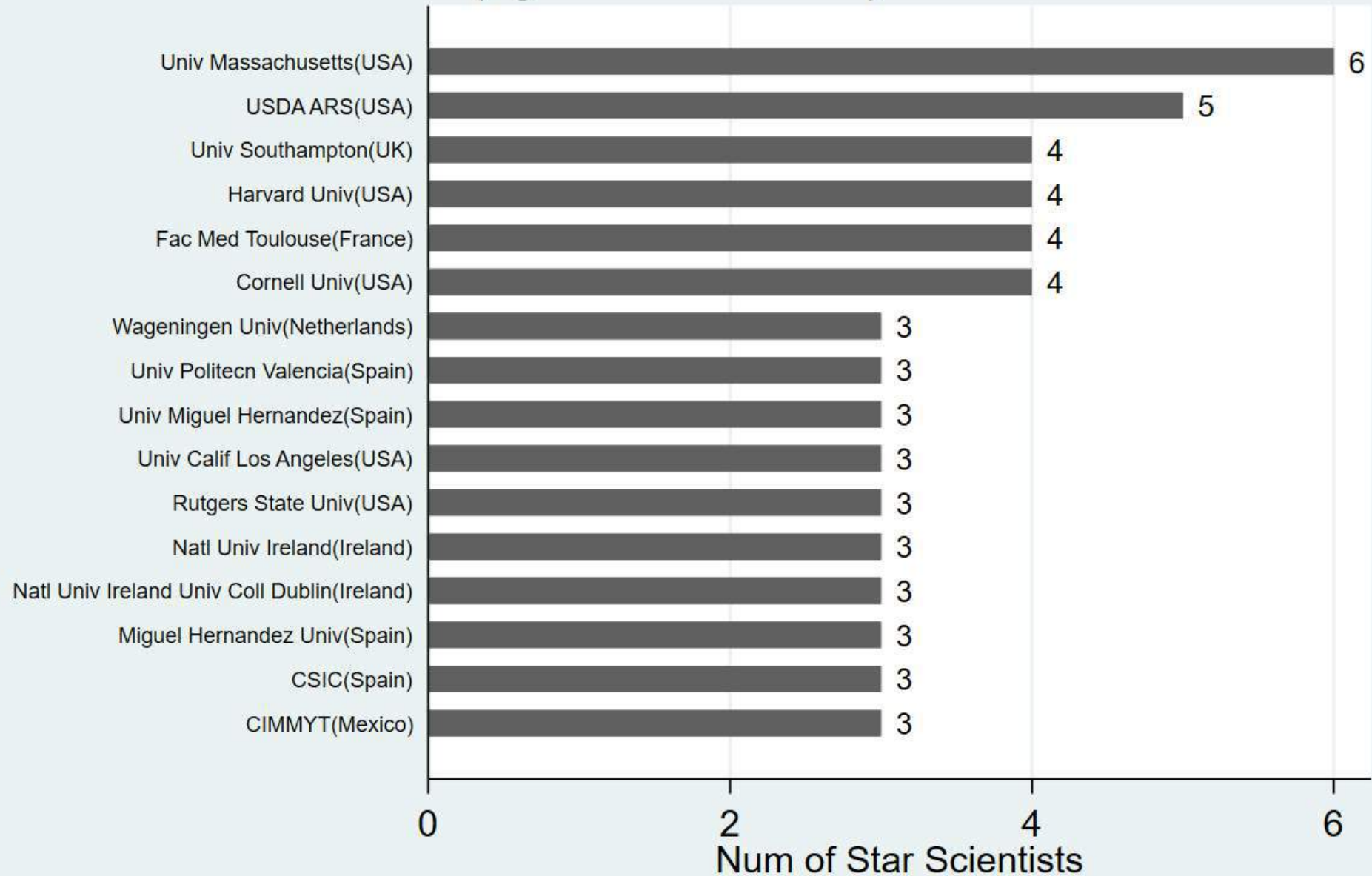
- 機関別にスター・サイエンティストの数を集計し, 分野別(+全分野)でランキング化する
 - ショートリスト, ロングリストのそれぞれにおいて行う
 - Top10となる機関名とその国・人数を棒グラフ化
- 研究者が複数の機関に所属している場合, HCPを1or2番目に多く出している機関にそれぞれ1カウント
- 全世界のランキングと日本国内のランキングそれぞれを作成
 - 日本国内ランキングにおいては, WoS掲載機関名の表記揺れ問題により同一機関が複数に分かれて掲載される場合が目立ったため, NISTEP[1]の表記揺れ対応辞書と結合することで, 代表機関名(日本語)に統一したランキングを作成

2-1. Ranking of Organizations by Num of Star Scientists(Short List)

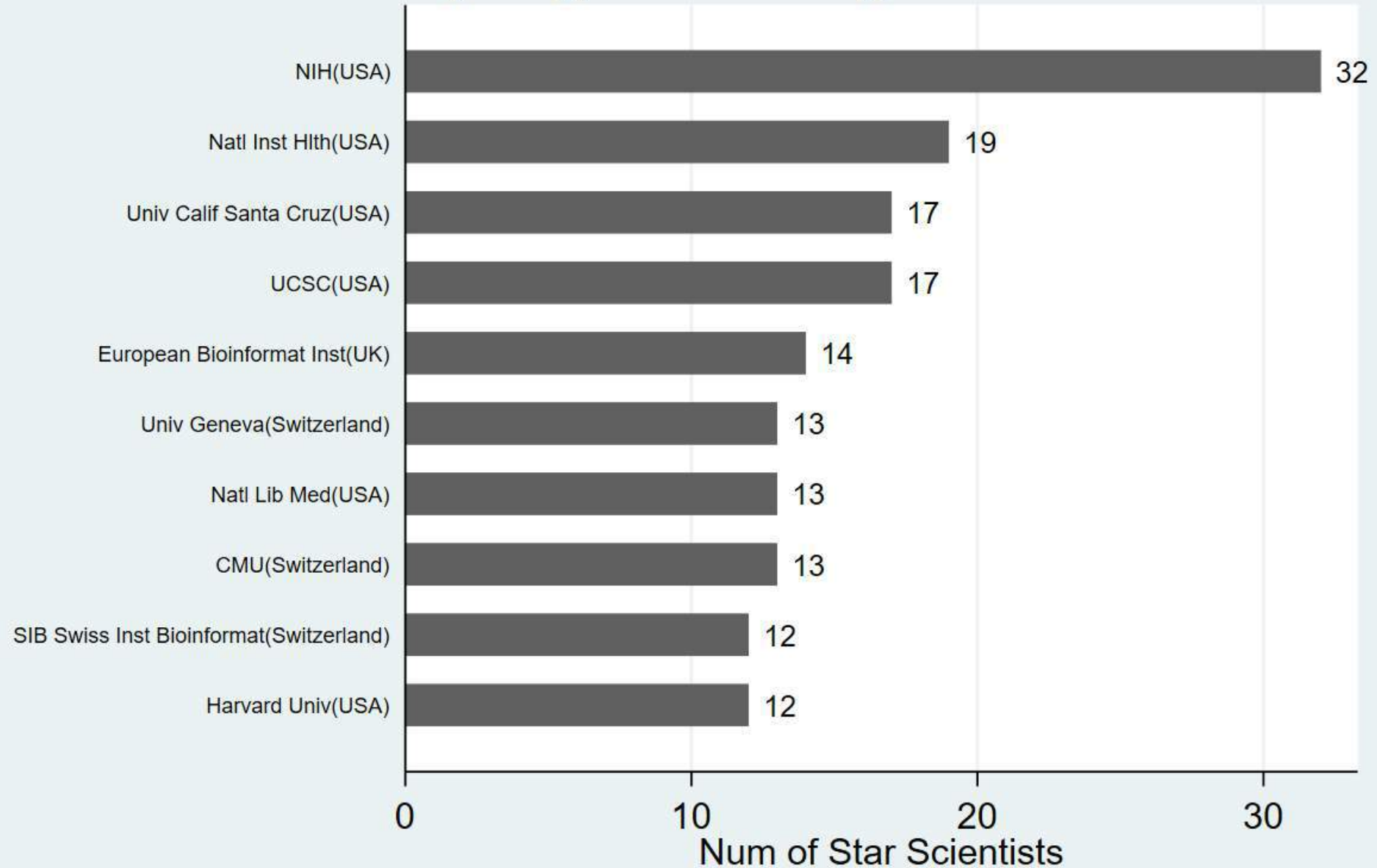
Ranking of Organizations by Num of Star Scientists(Short List) (All Categories)



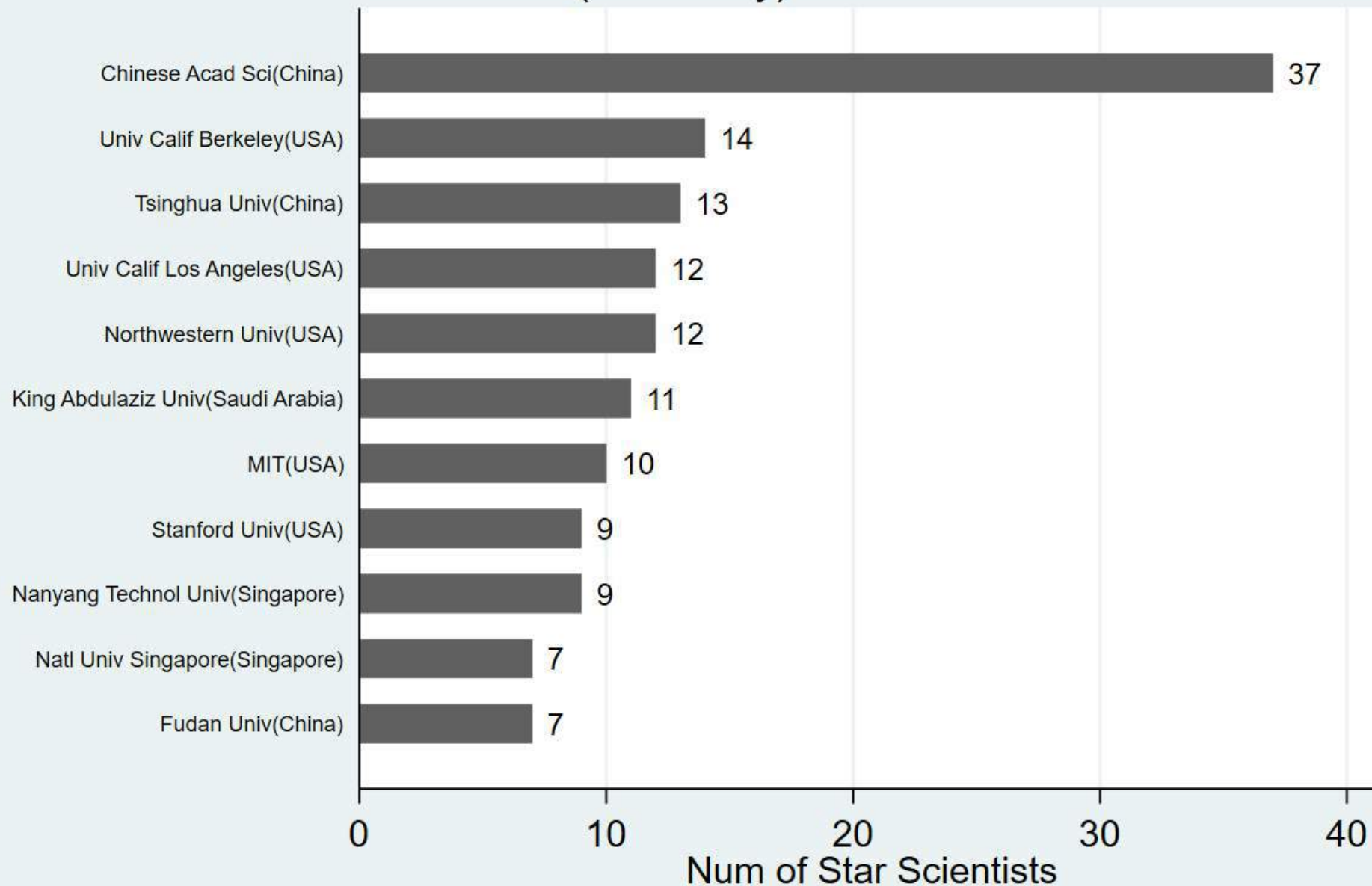
Ranking of Organizations by Num of Star Scientists(Short List) (Agricultural Sciences)



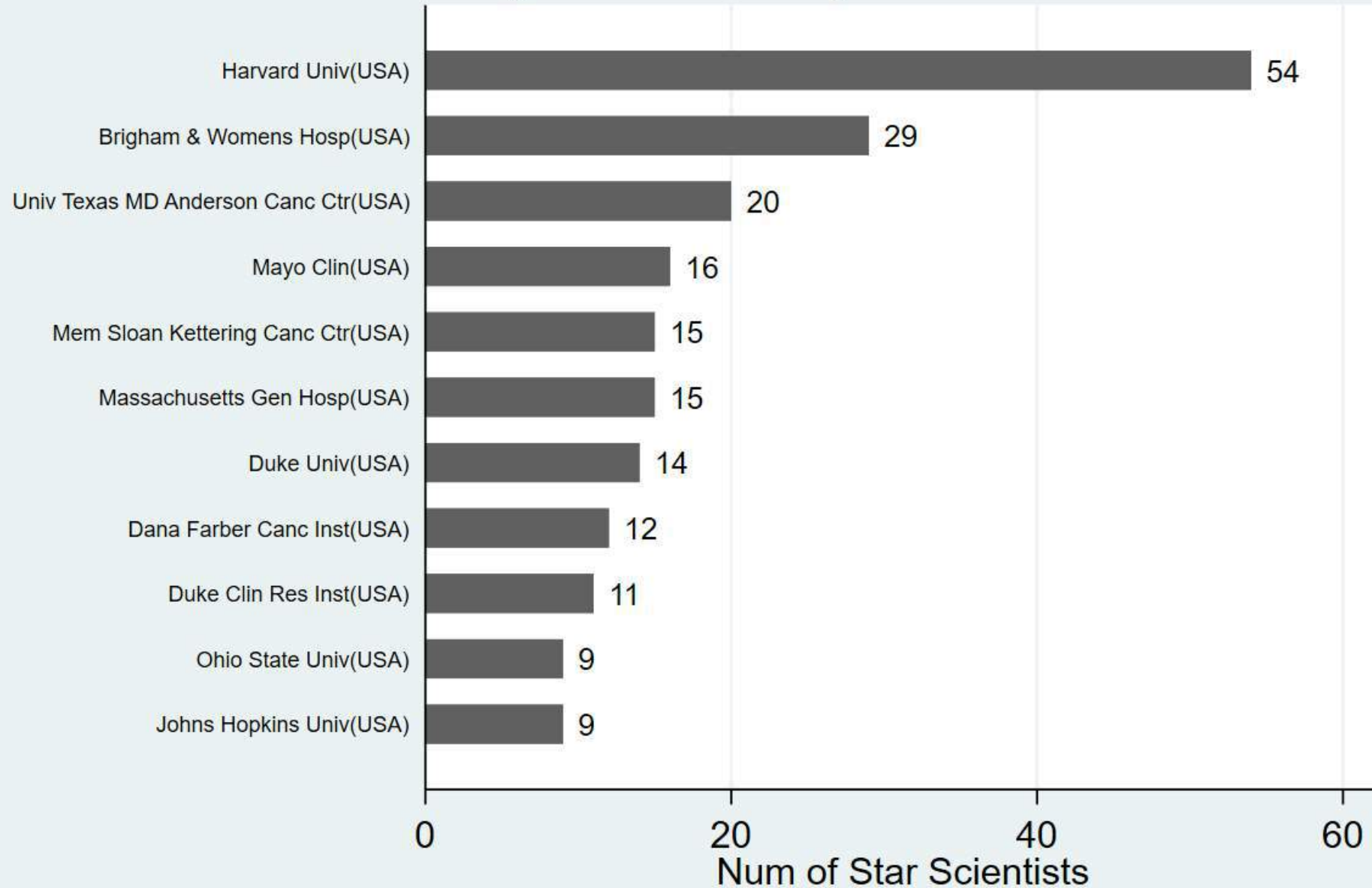
Ranking of Organizations by Num of Star Scientists(Short List) (Biology & Biochemistry)



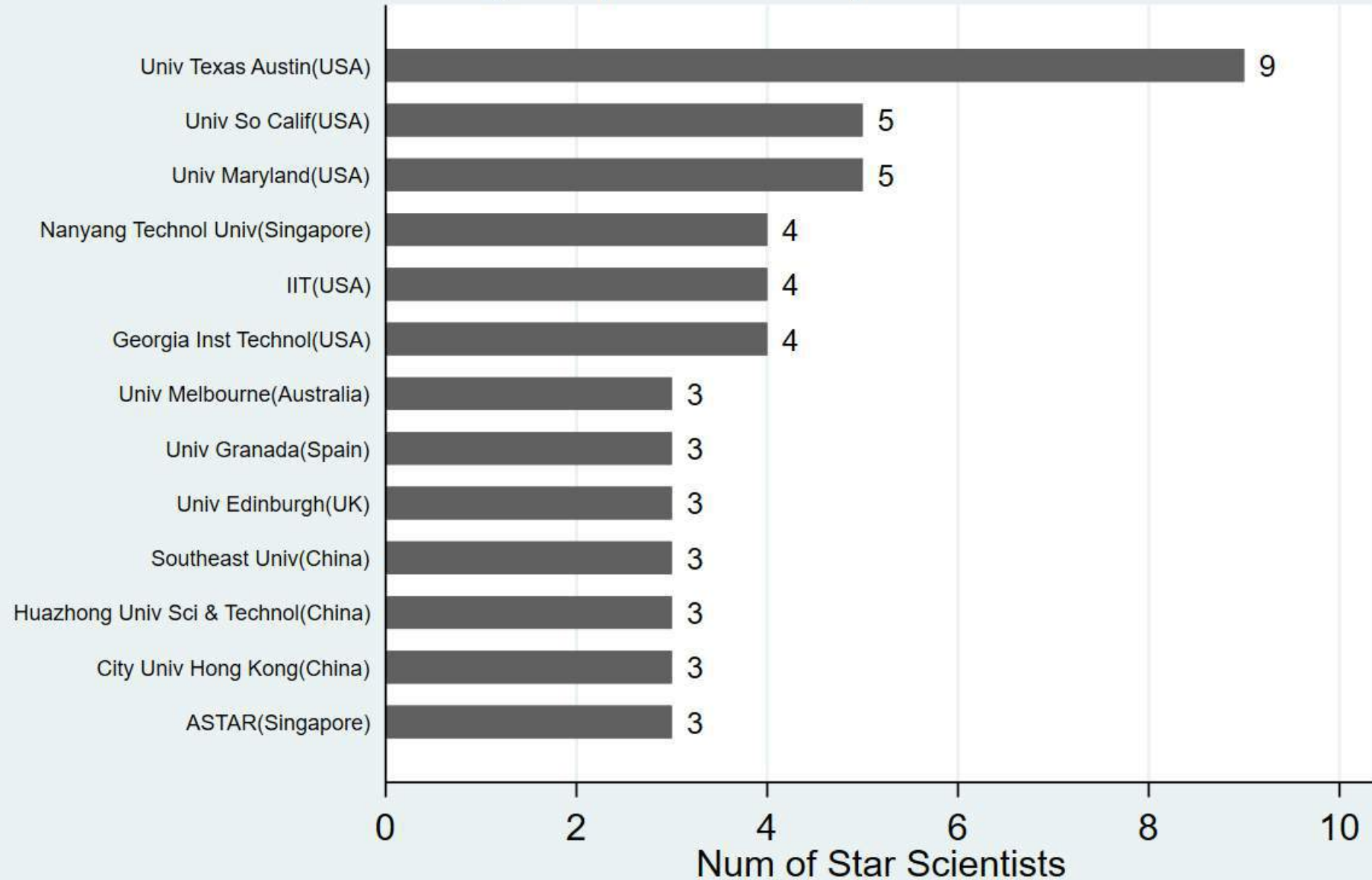
Ranking of Organizations by Num of Star Scientists(Short List) (Chemistry)



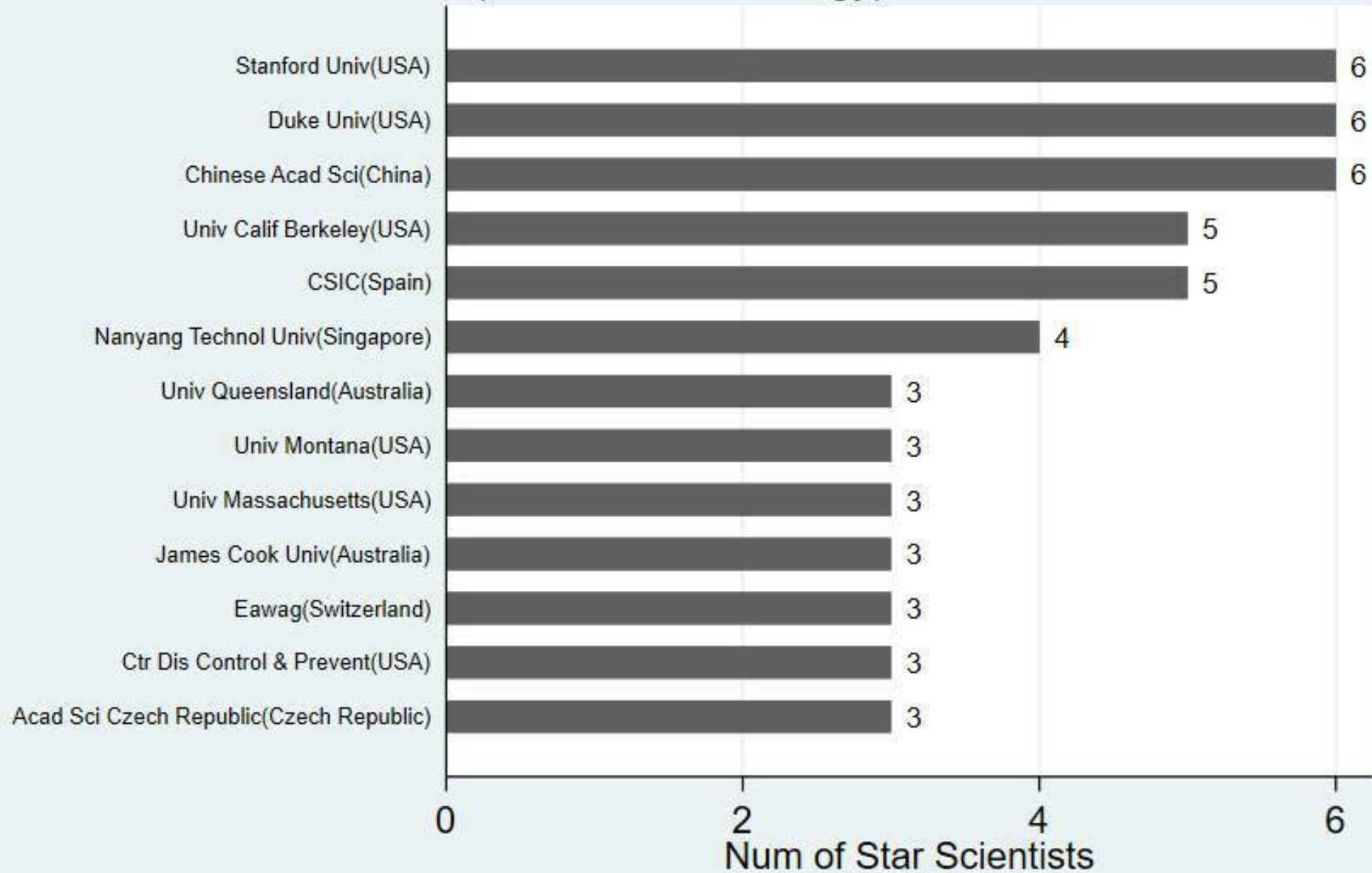
Ranking of Organizations by Num of Star Scientists(Short List) (Clinical Medicine)



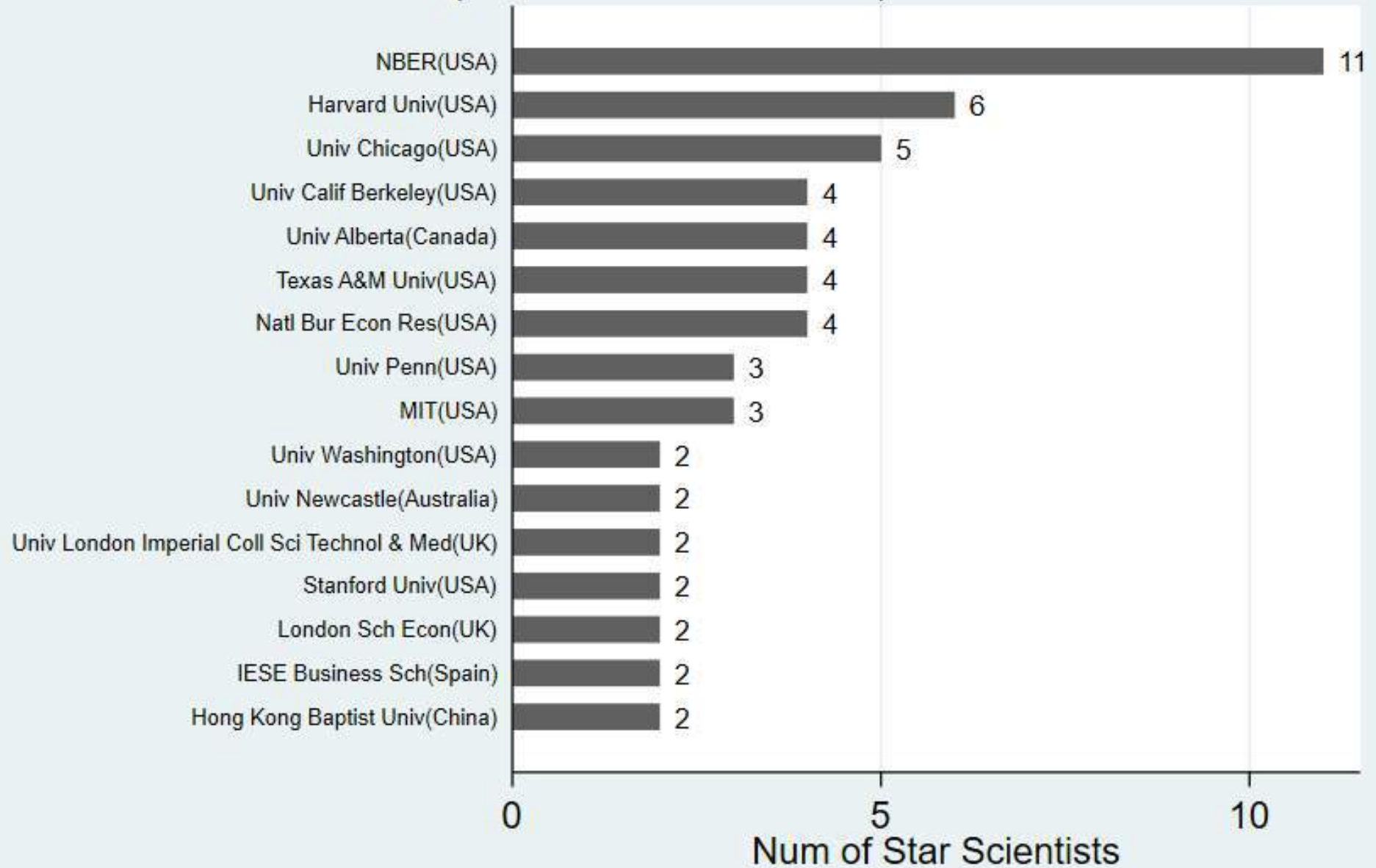
Ranking of Organizations by Num of Star Scientists(Short List) (Computer Science)



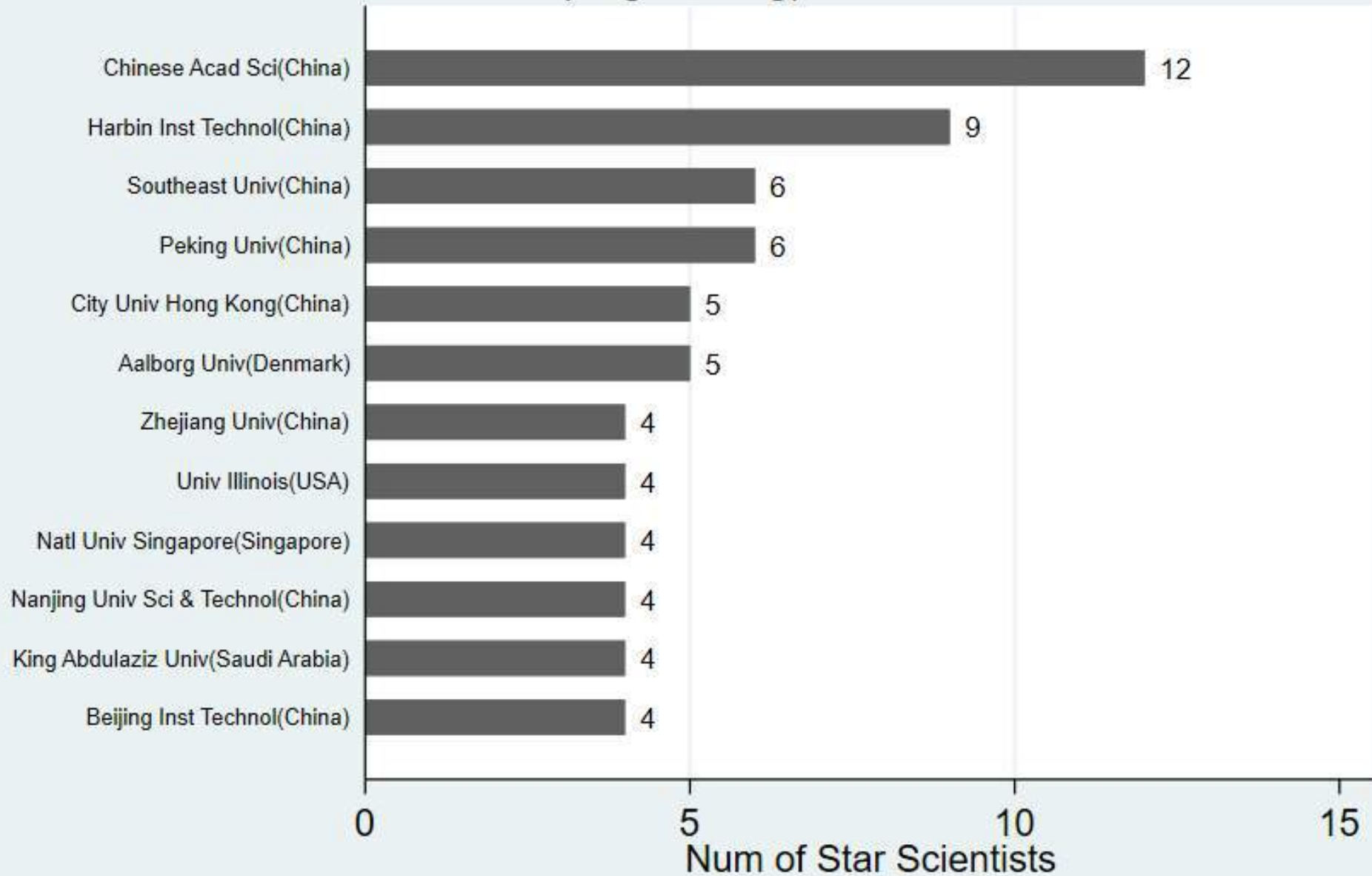
Ranking of Organizations by Num of Star Scientists(Short List) (Environment/Ecology)



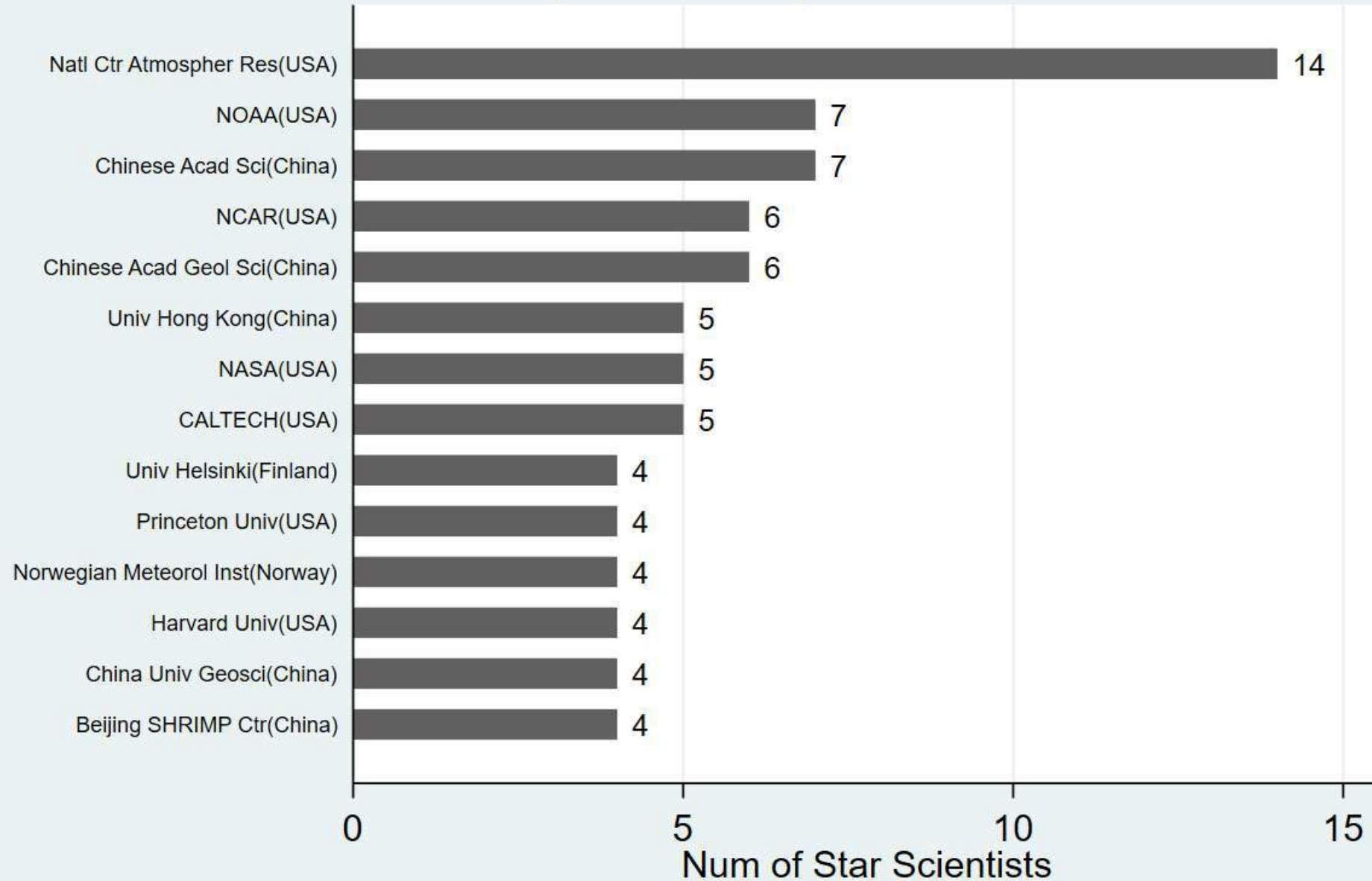
Ranking of Organizations by Num of Star Scientists(Short List) (Economics & Business)



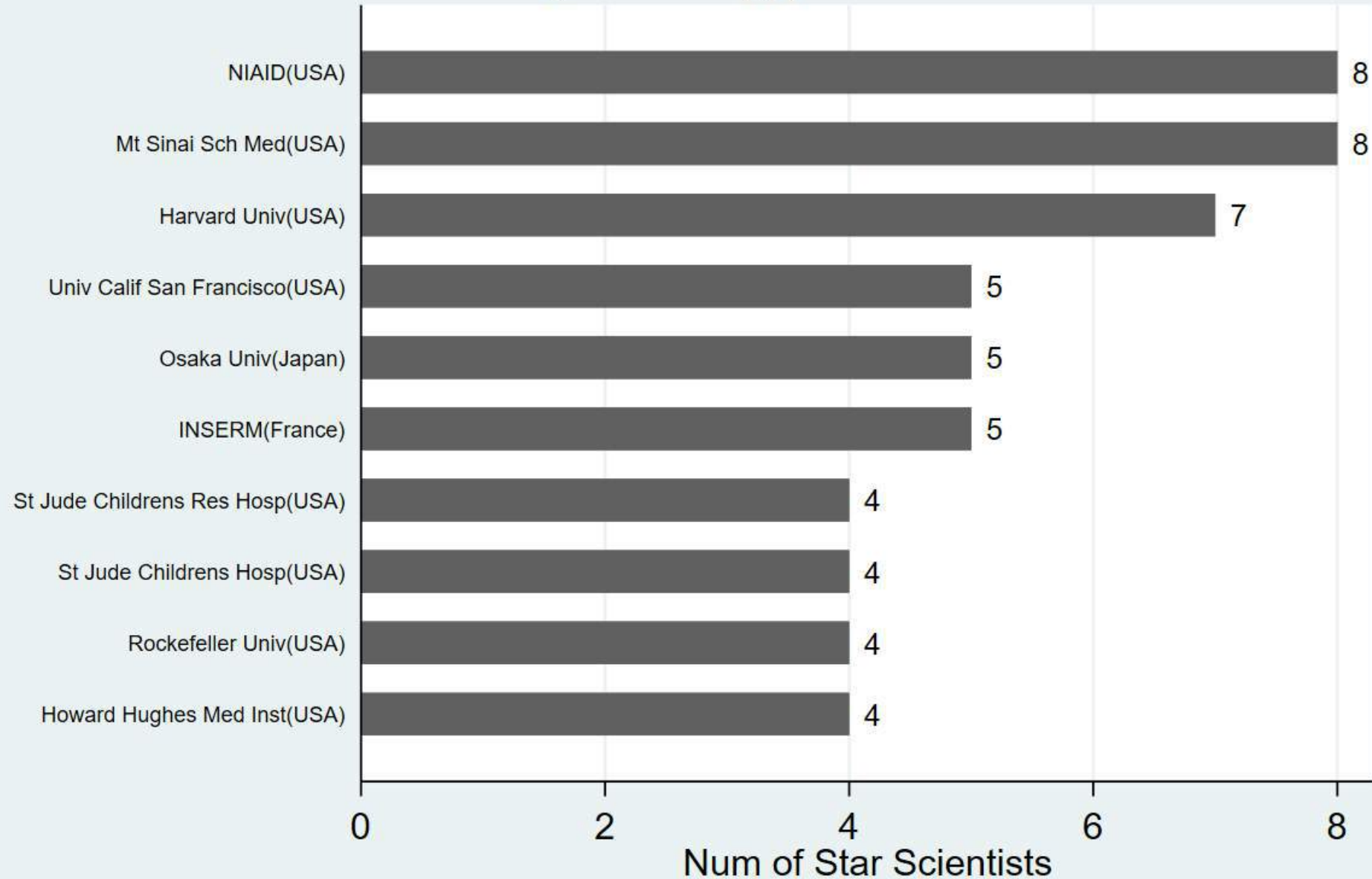
Ranking of Organizations by Num of Star Scientists(Short List) (Engineering)



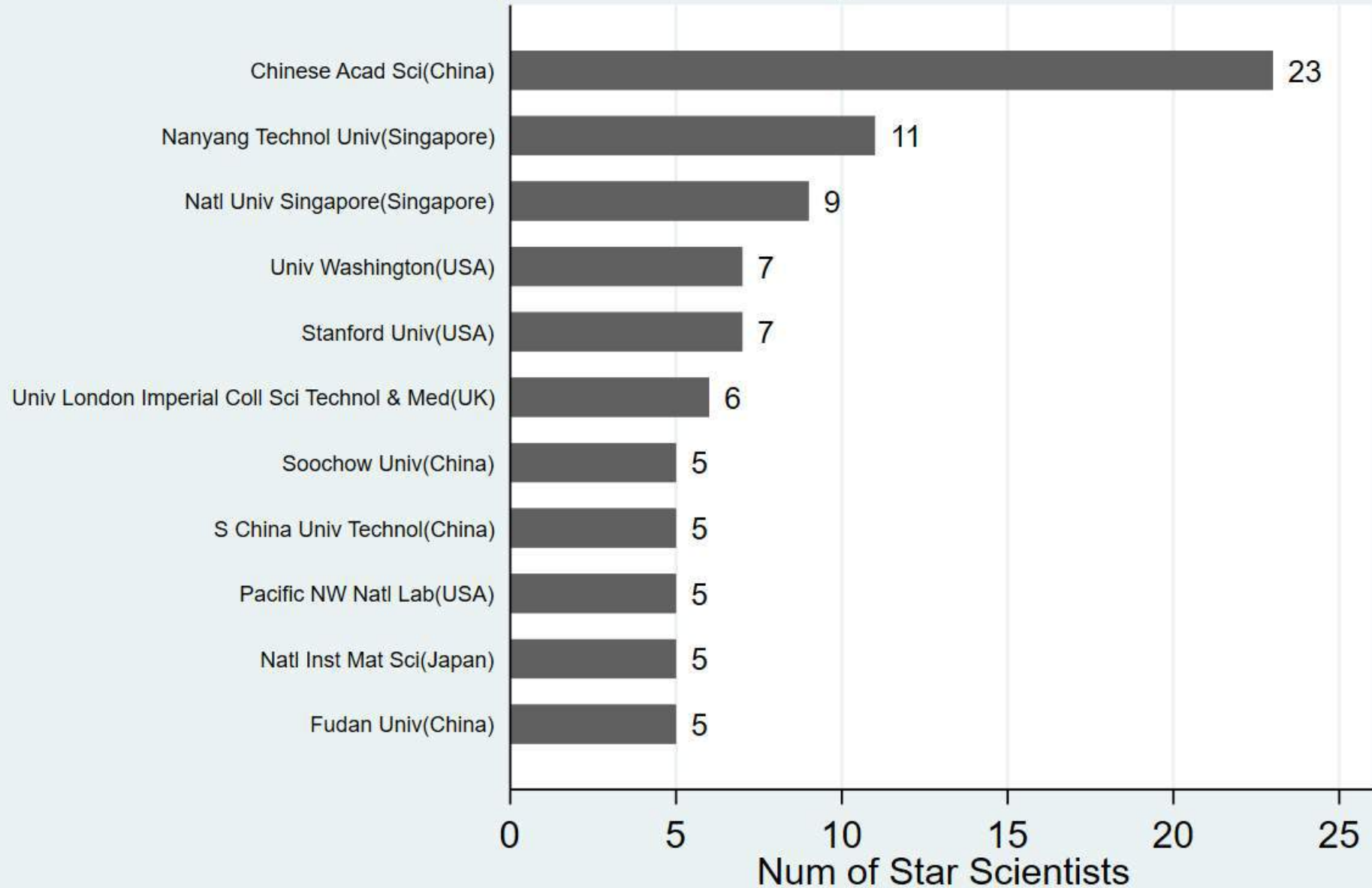
Ranking of Organizations by Num of Star Scientists(Short List) (Geosciences)



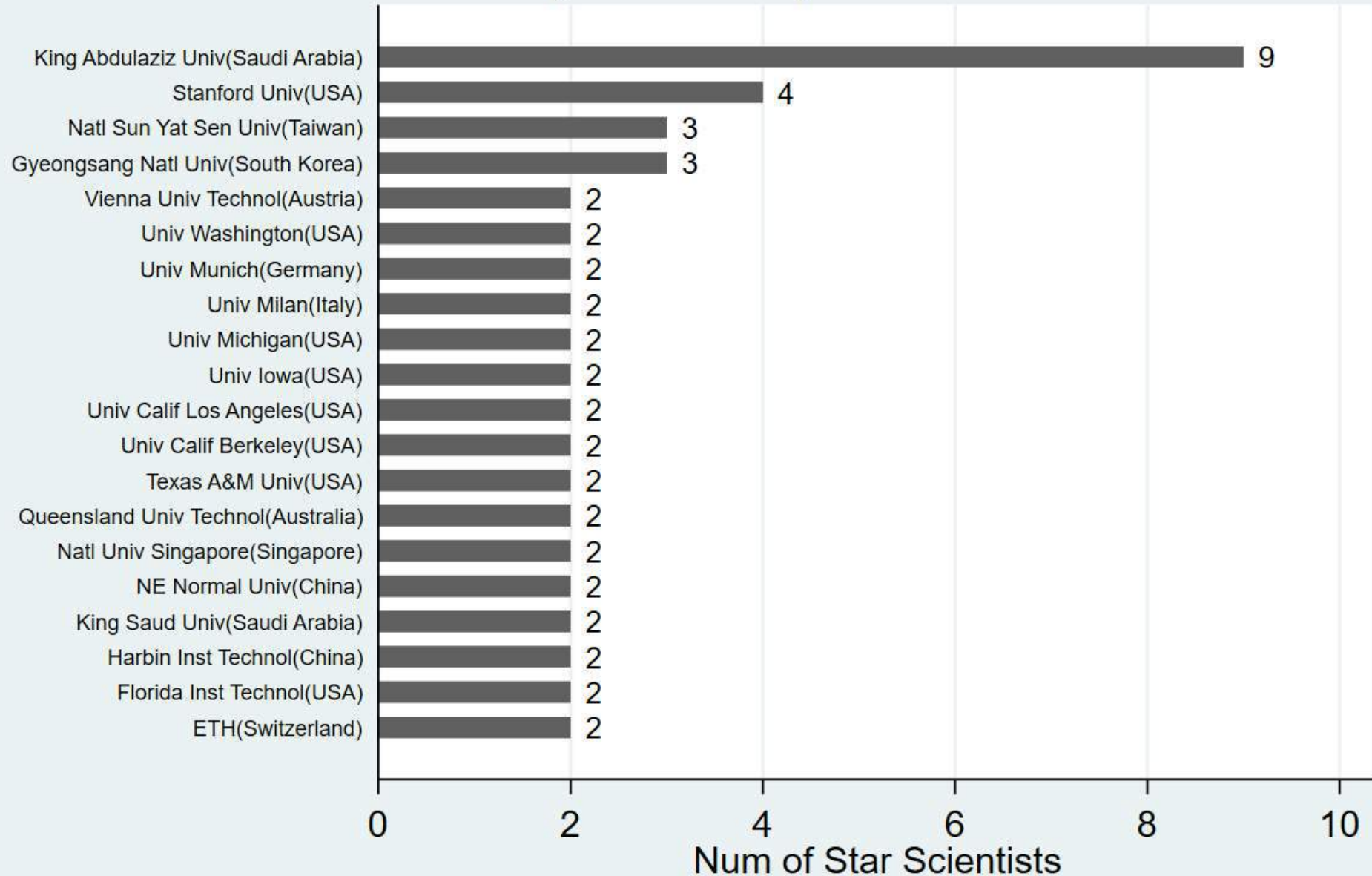
Ranking of Organizations by Num of Star Scientists(Short List) (Immunology)



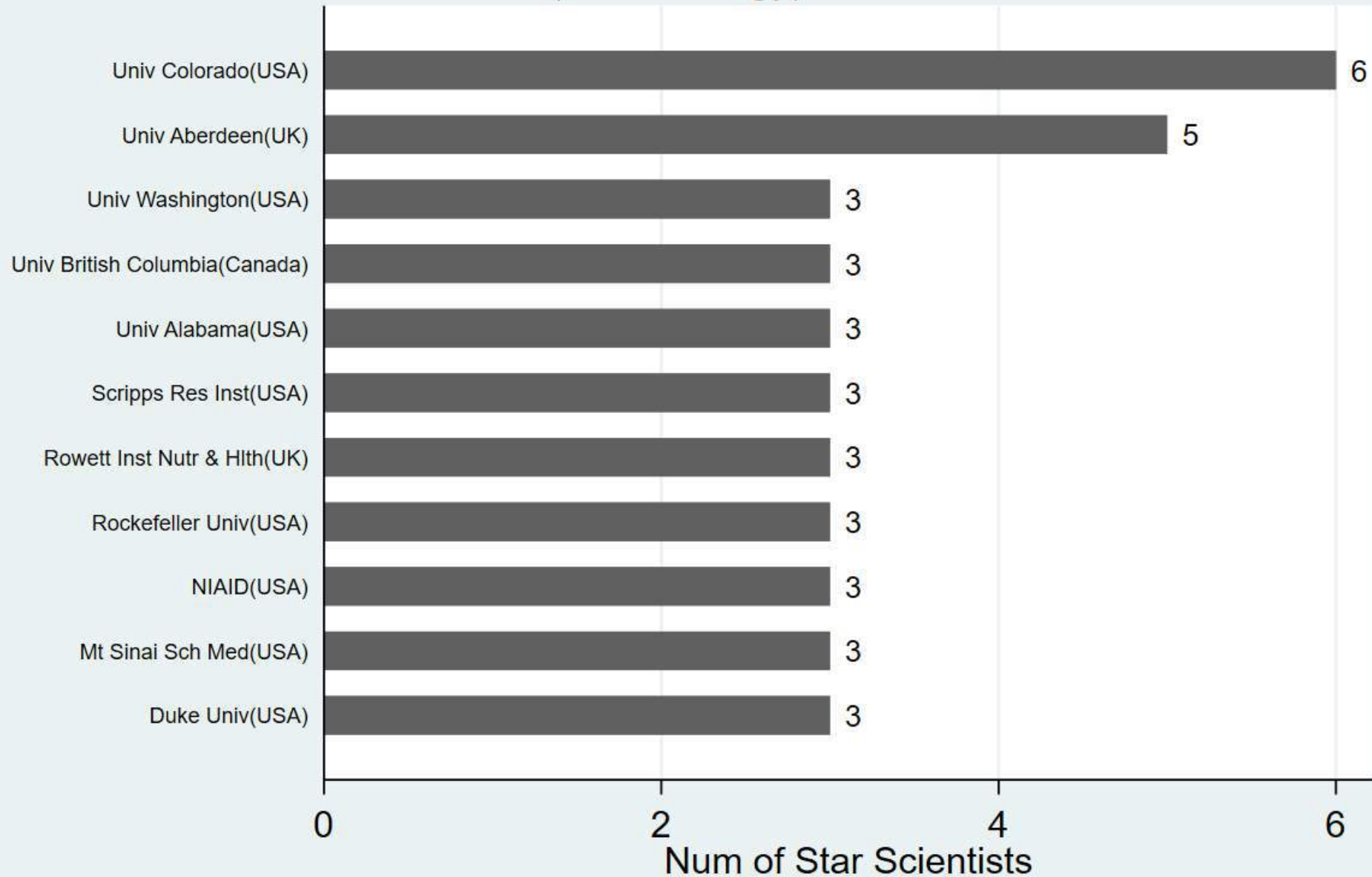
Ranking of Organizations by Num of Star Scientists(Short List) (Materials Science)



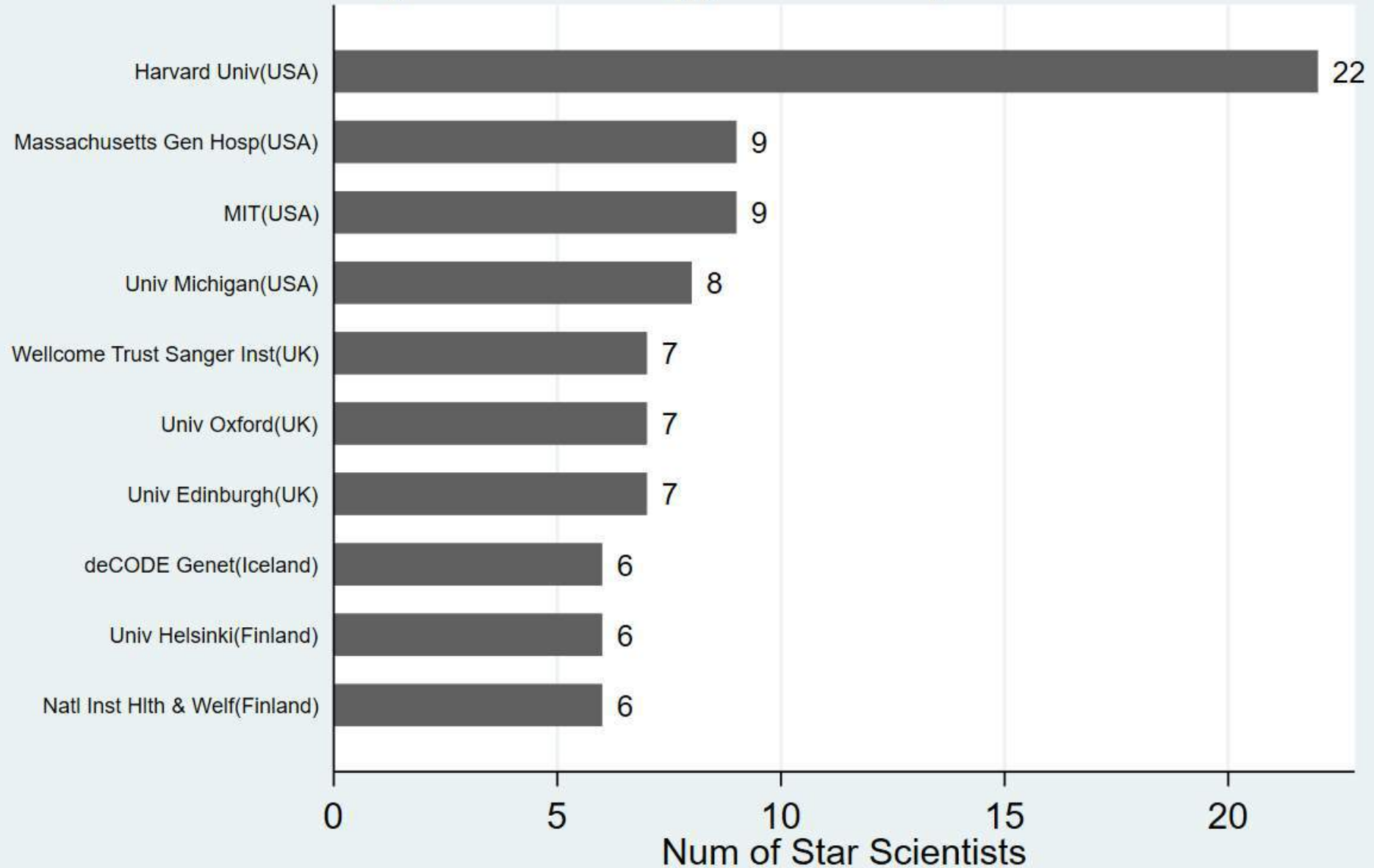
Ranking of Organizations by Num of Star Scientists(Short List) (Mathematics)



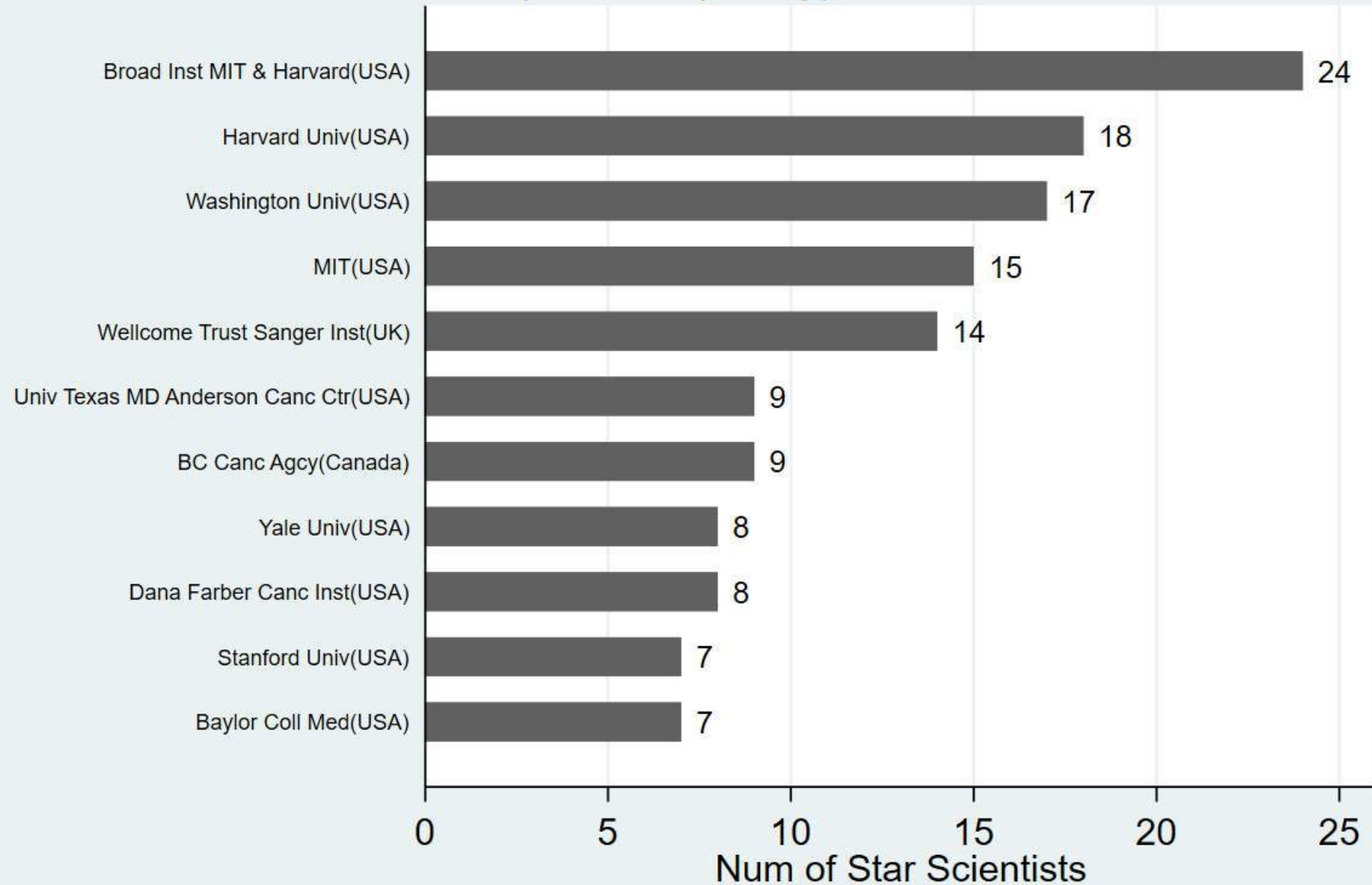
Ranking of Organizations by Num of Star Scientists(Short List) (Microbiology)



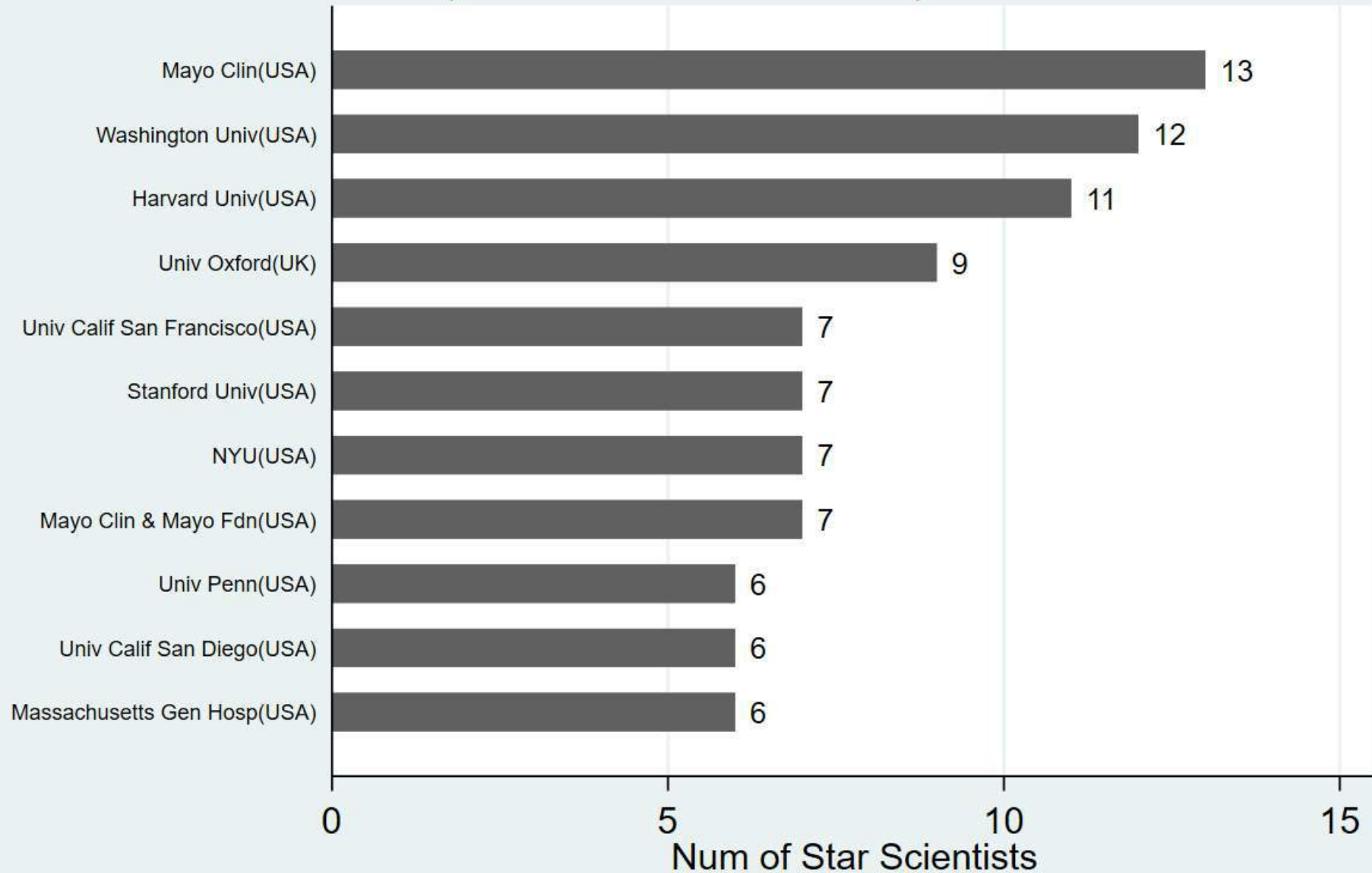
Ranking of Organizations by Num of Star Scientists(Short List) (Molecular Biology & Genetics)



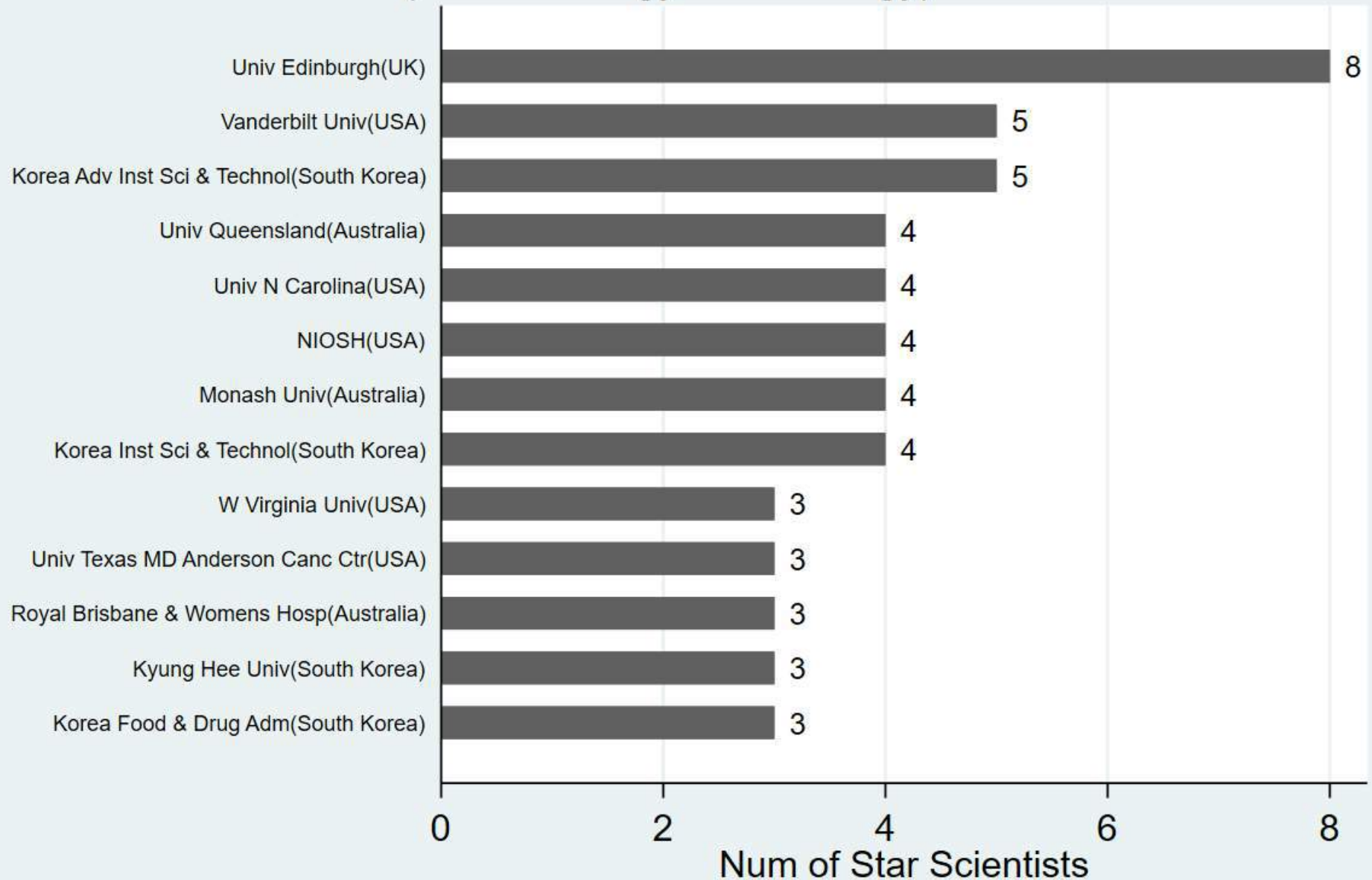
Ranking of Organizations by Num of Star Scientists(Short List) (Multidisciplinary)



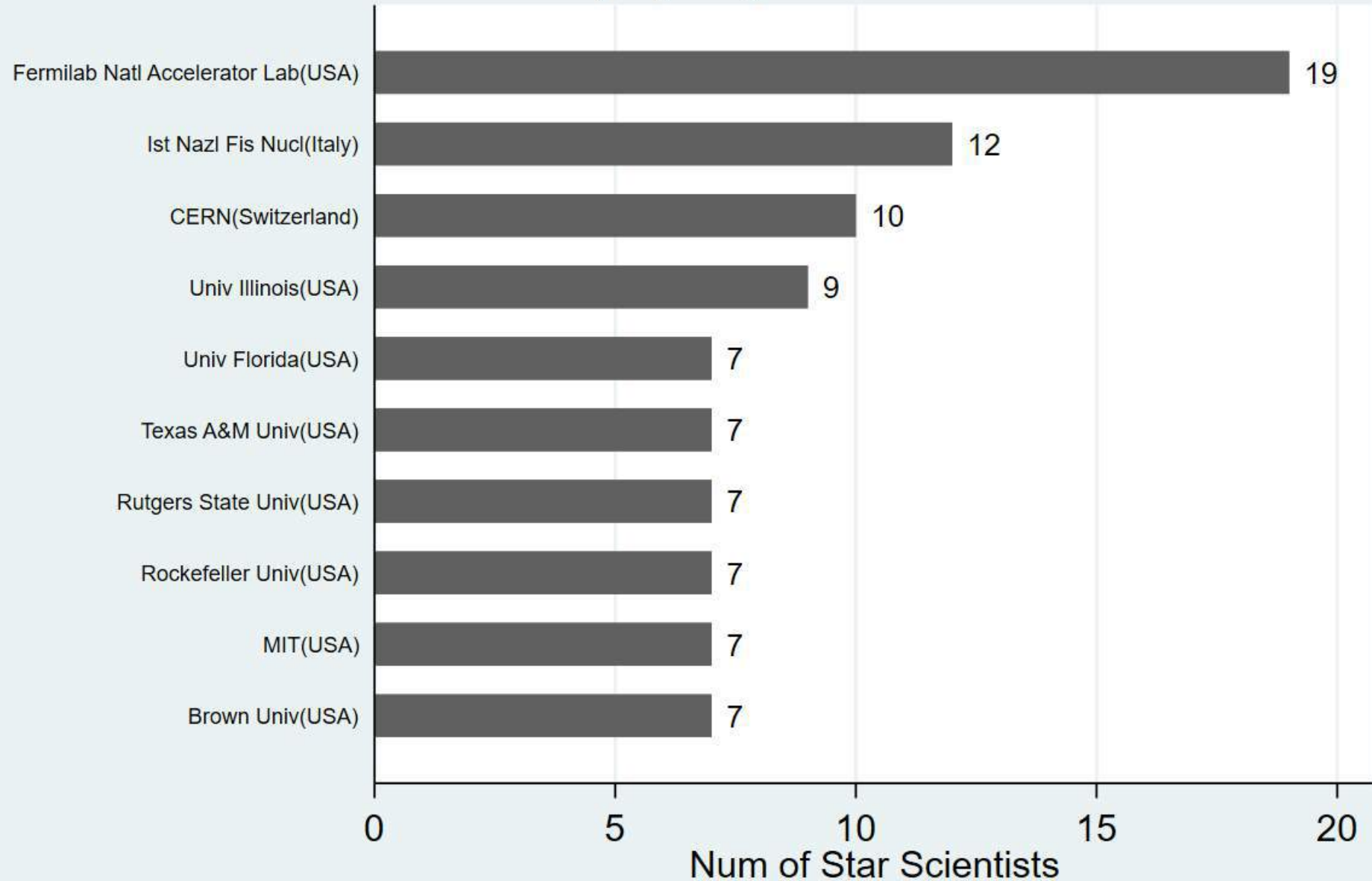
Ranking of Organizations by Num of Star Scientists(Short List) (Neuroscience & Behavior)



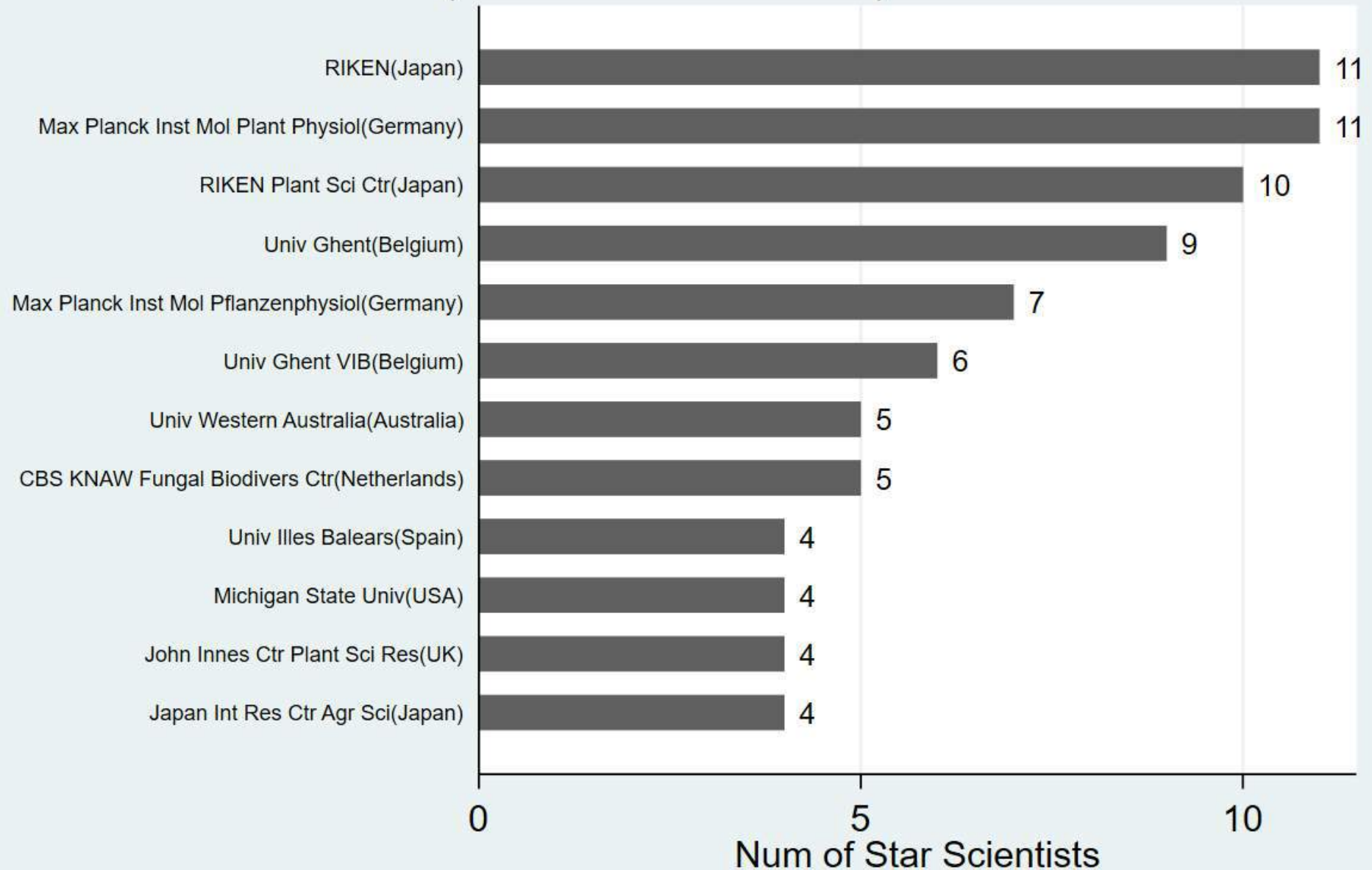
Ranking of Organizations by Num of Star Scientists(Short List) (Pharmacology & Toxicology)



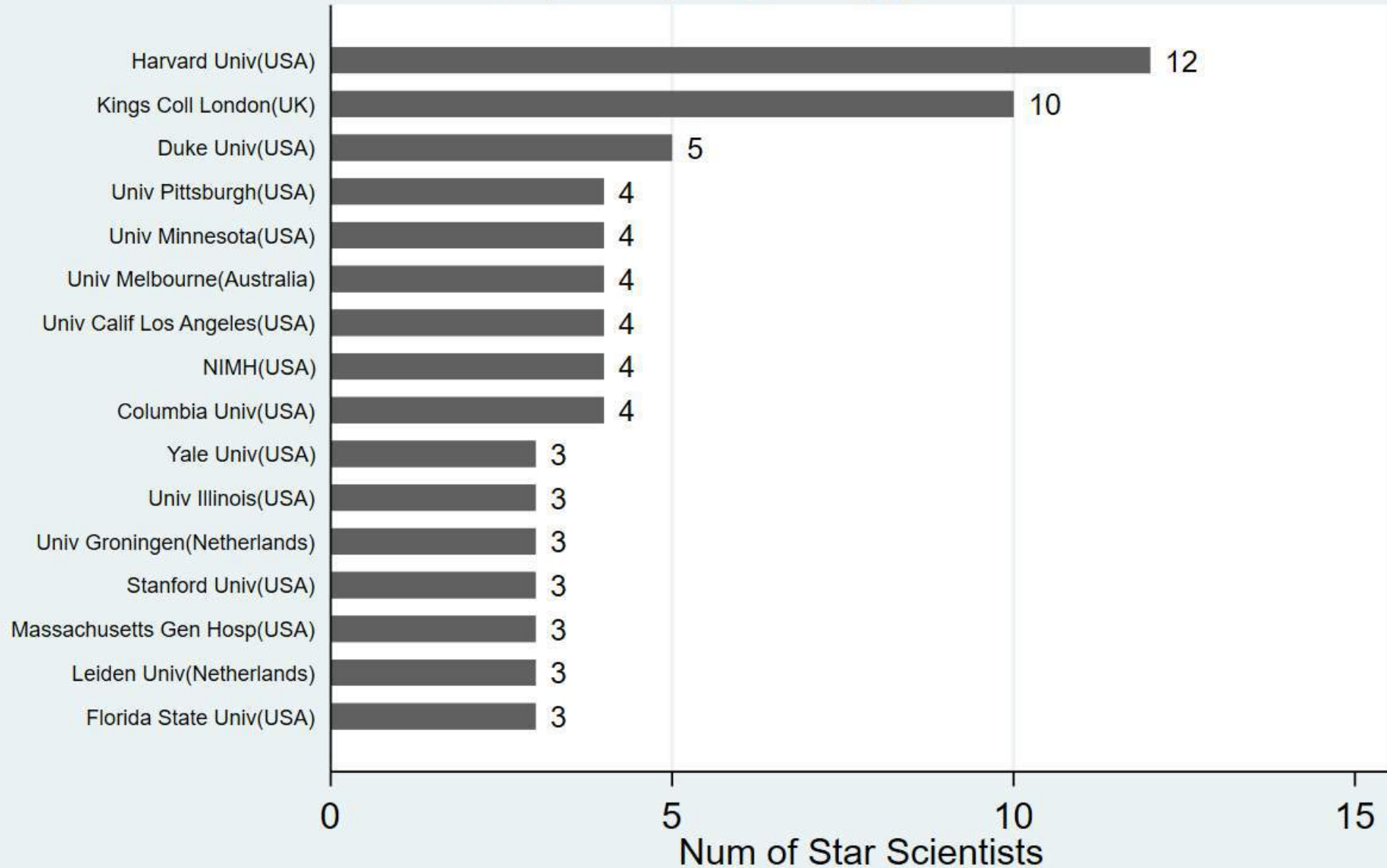
Ranking of Organizations by Num of Star Scientists(Short List) (Physics)



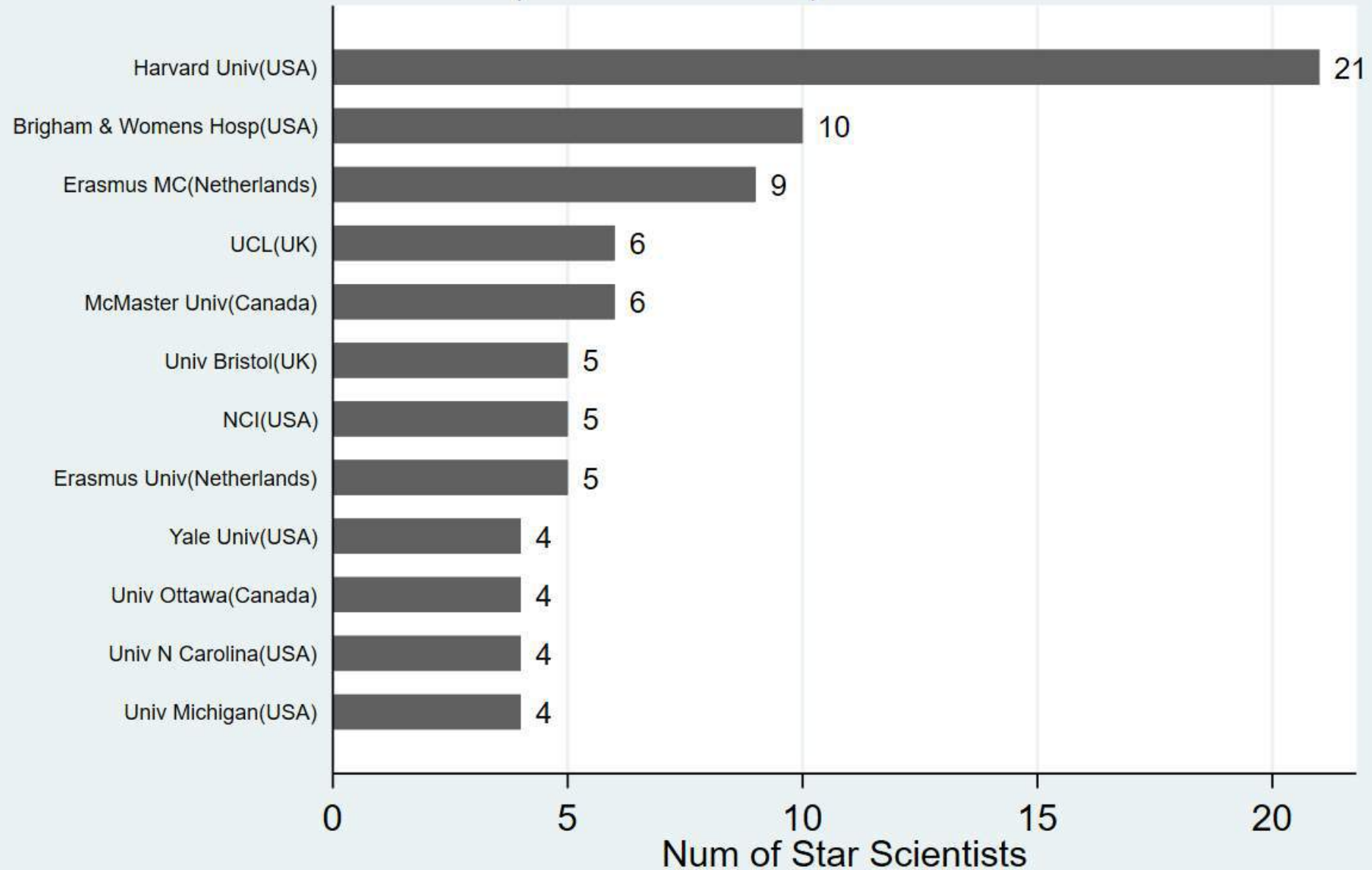
Ranking of Organizations by Num of Star Scientists(Short List) (Plant & Animal Science)



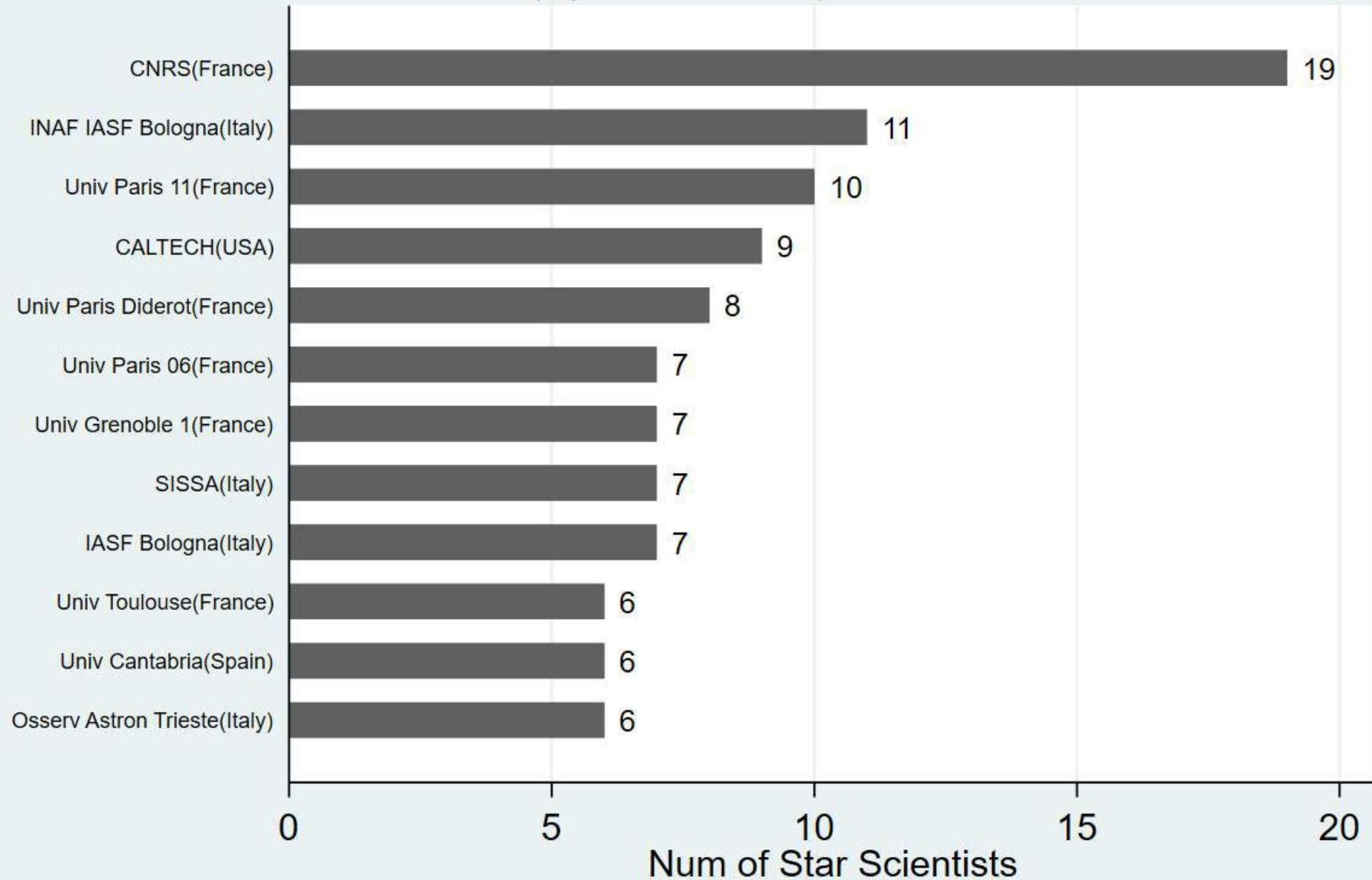
Ranking of Organizations by Num of Star Scientists(Short List) (Psychiatry/Psychology)



Ranking of Organizations by Num of Star Scientists(Short List) (Social Sciences)



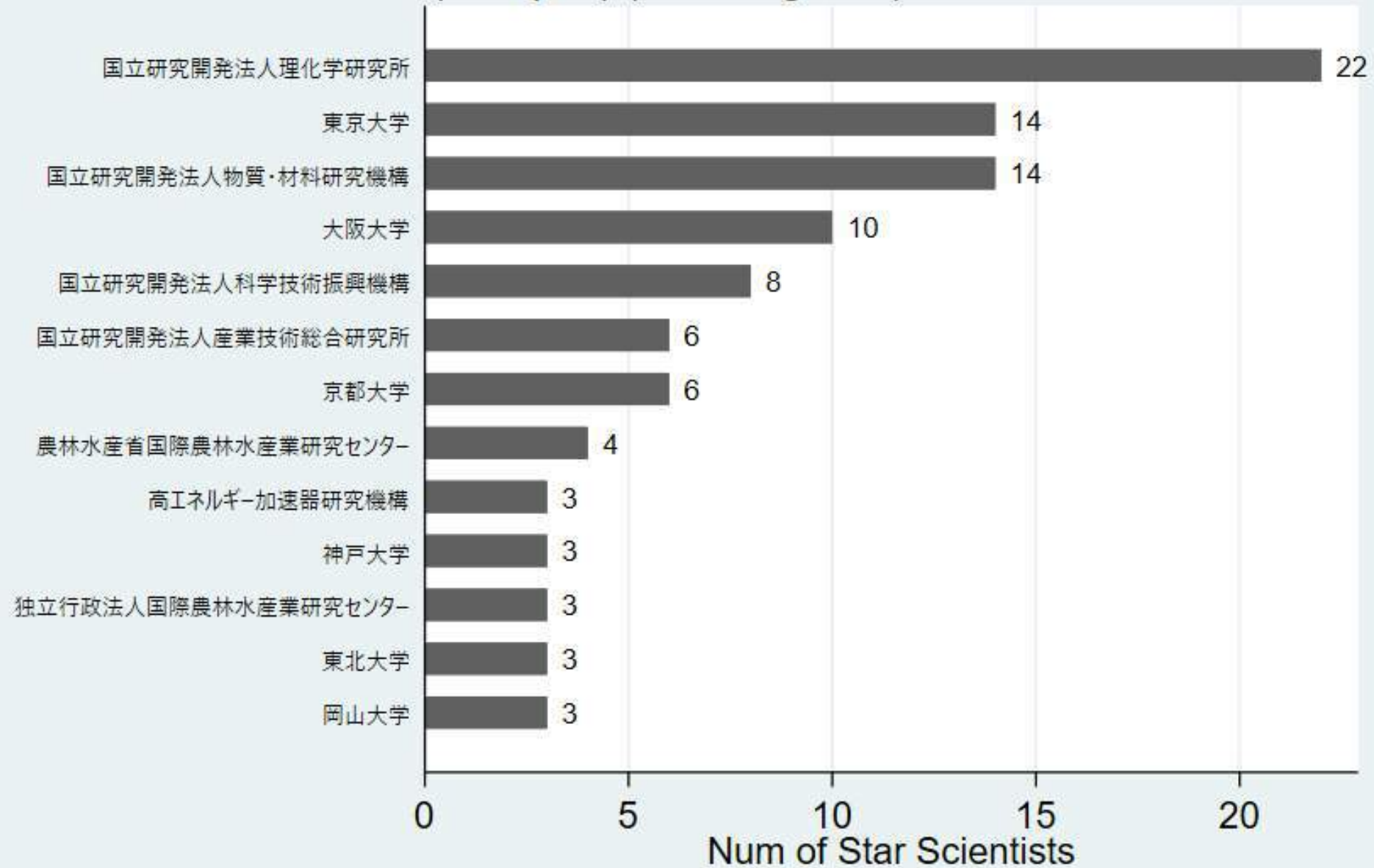
Ranking of Organizations by Num of Star Scientists(Short List) (Space Science)



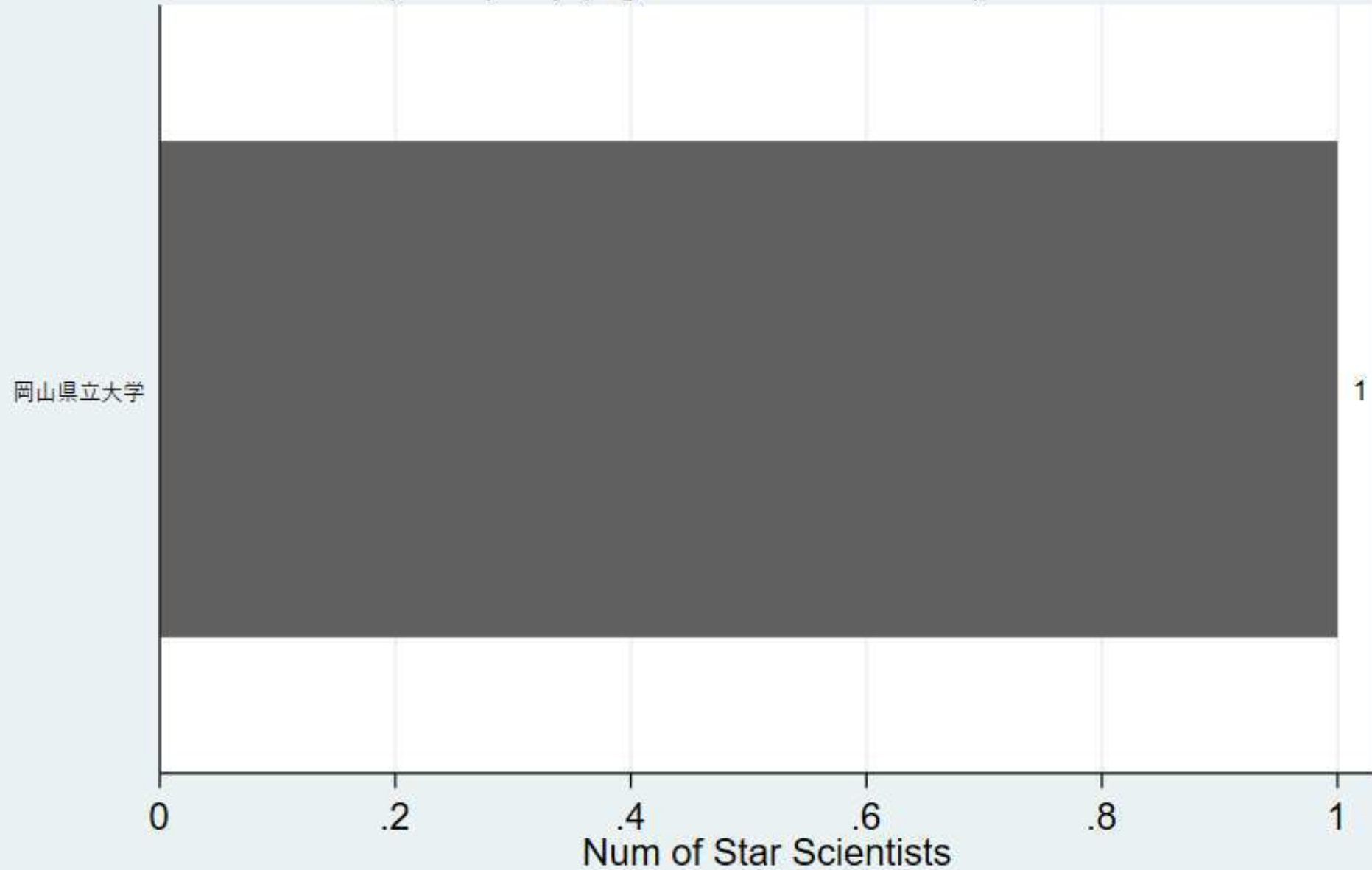
2-2.

Ranking of Organizations (in Japan) by Num of Star Scientists (Short List)

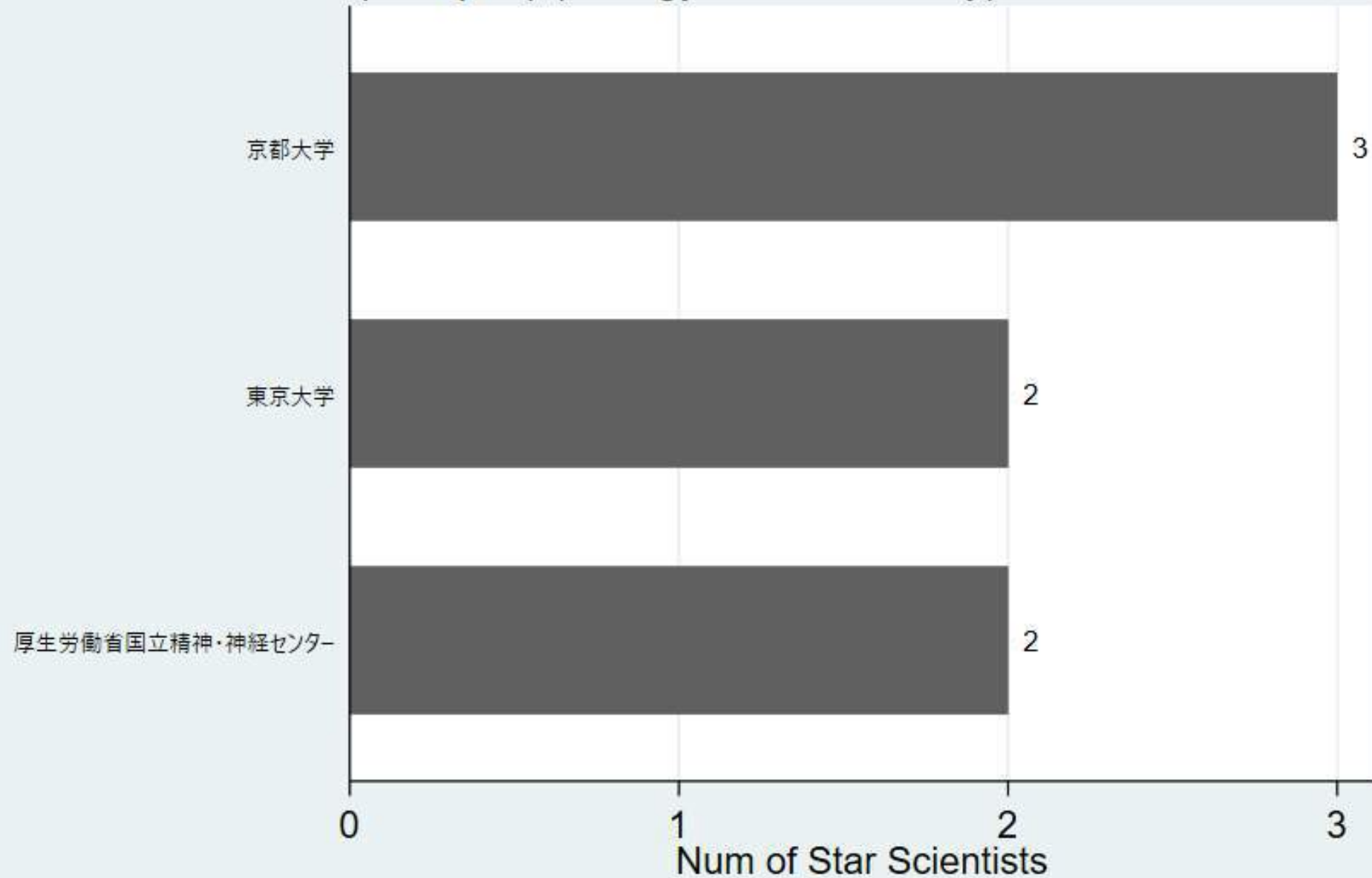
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (All Categories)



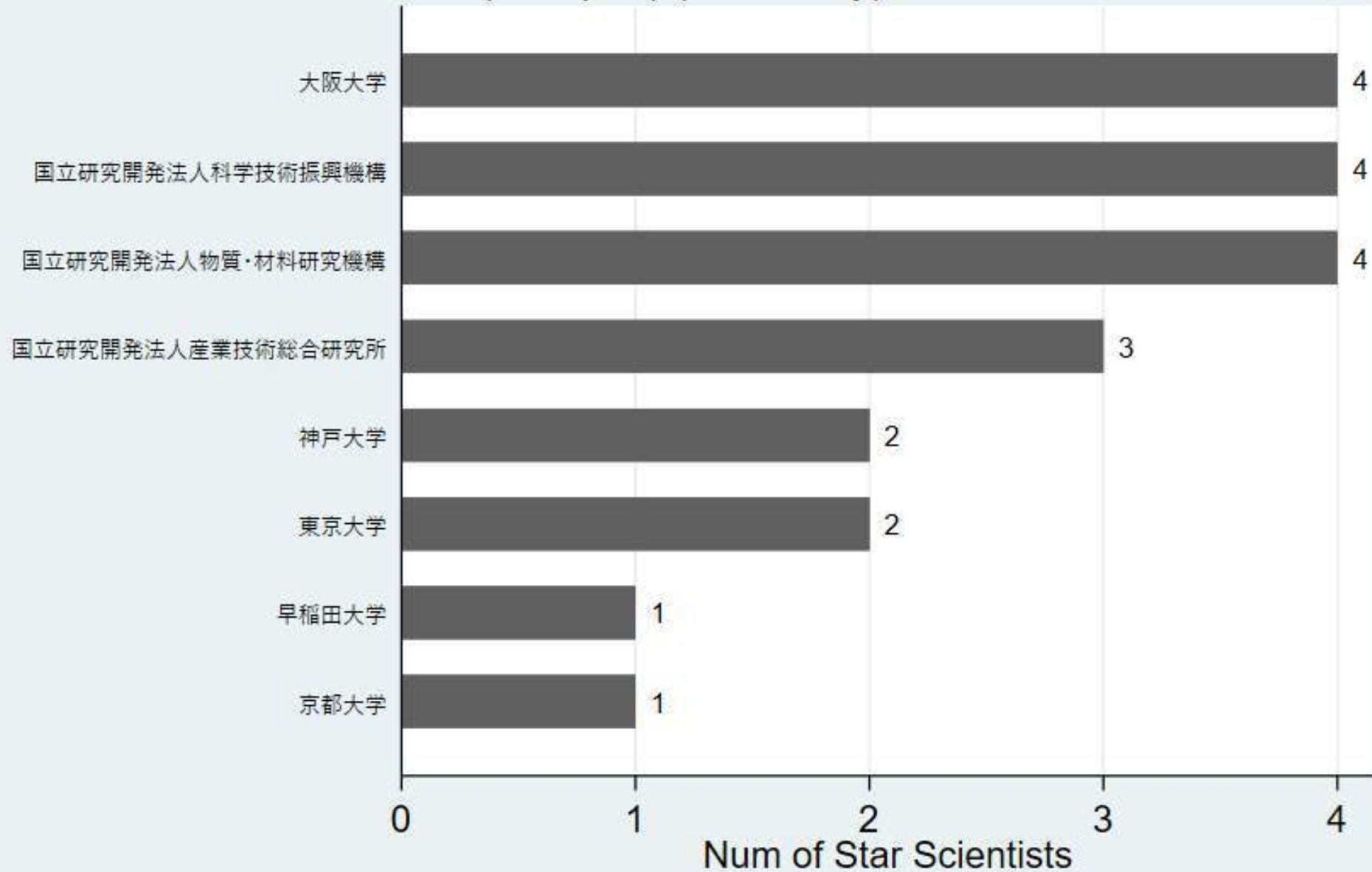
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Agricultural Sciences)



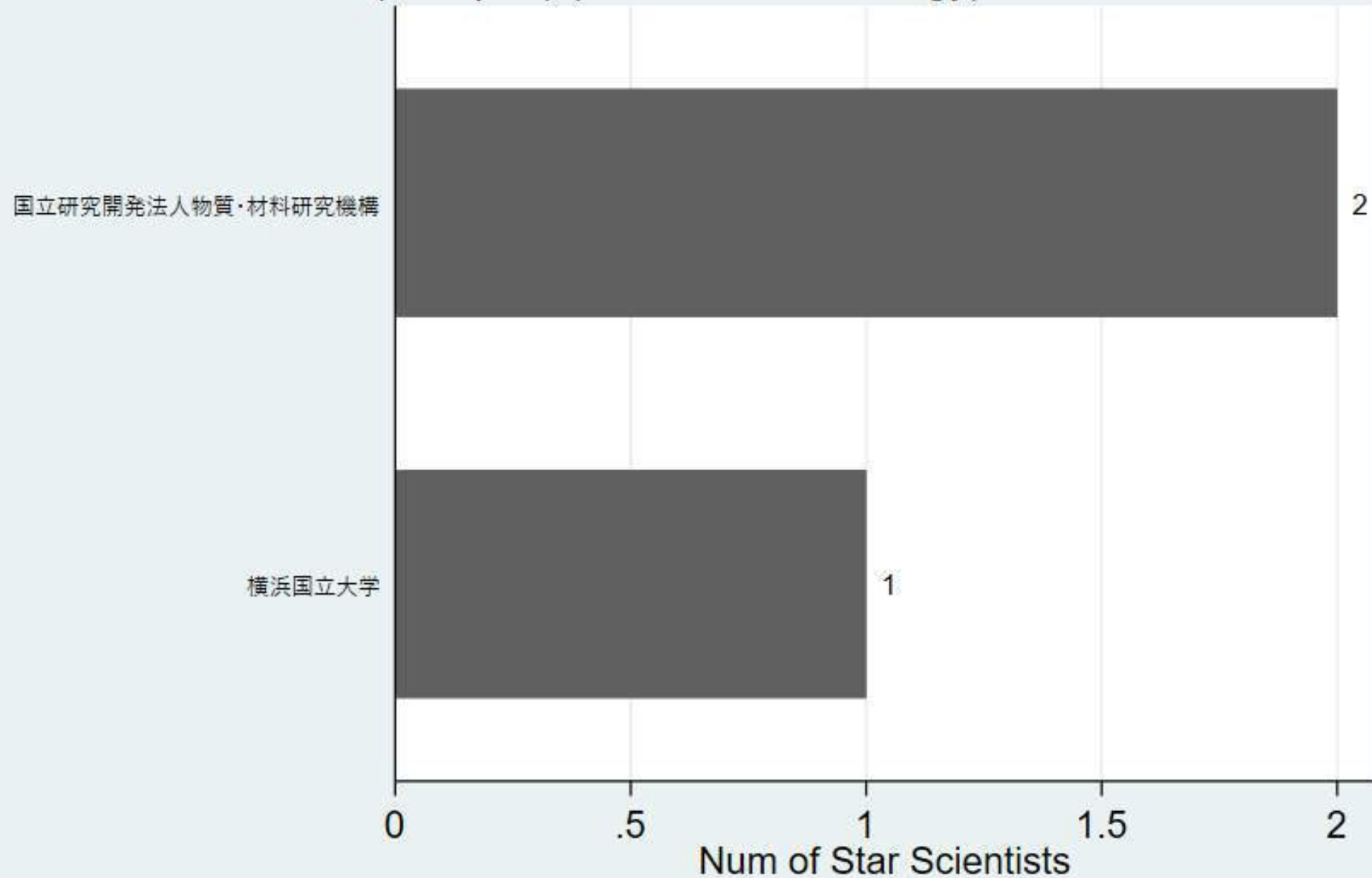
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Biology & Biochemistry)



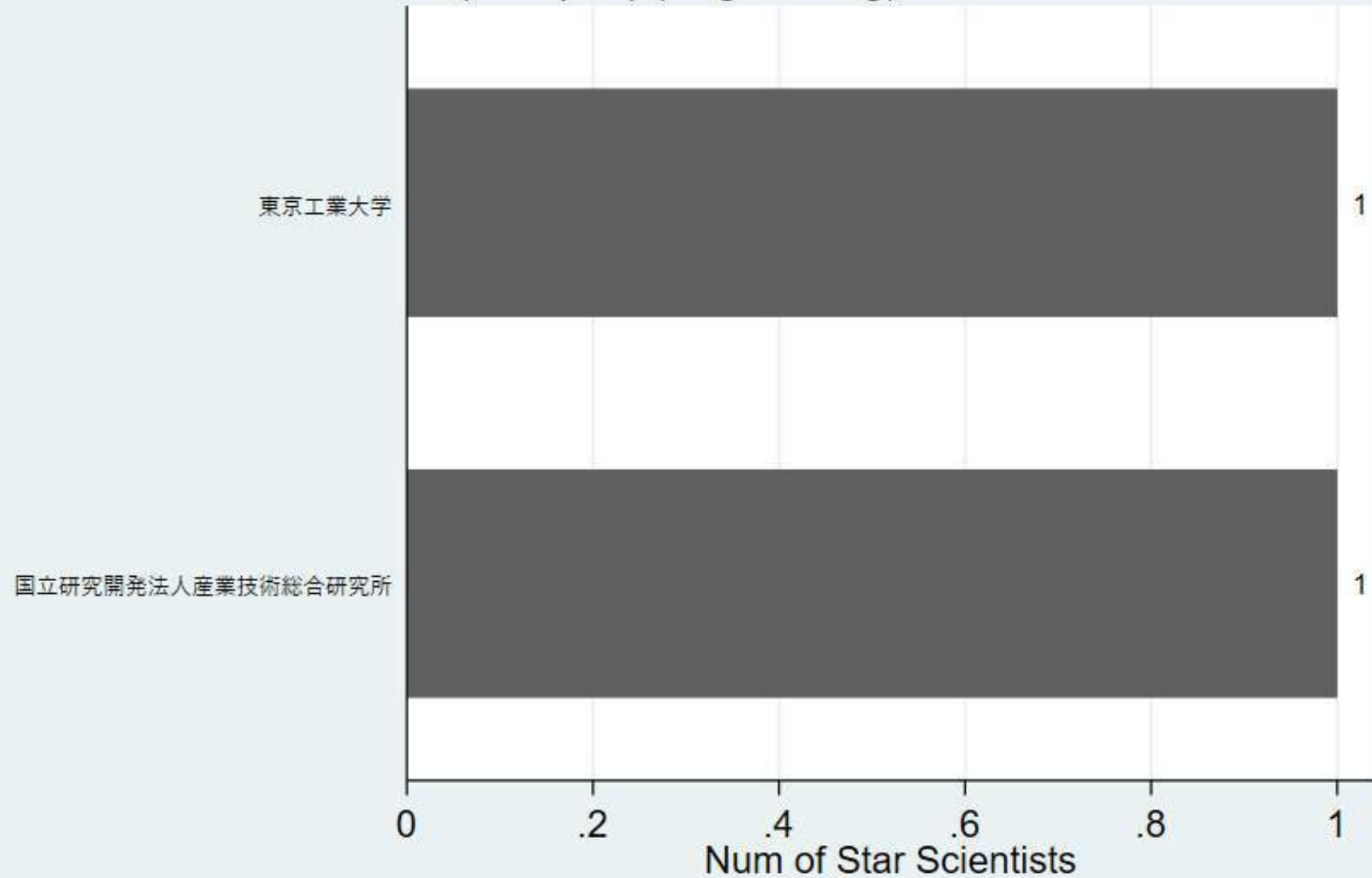
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Chemistry)



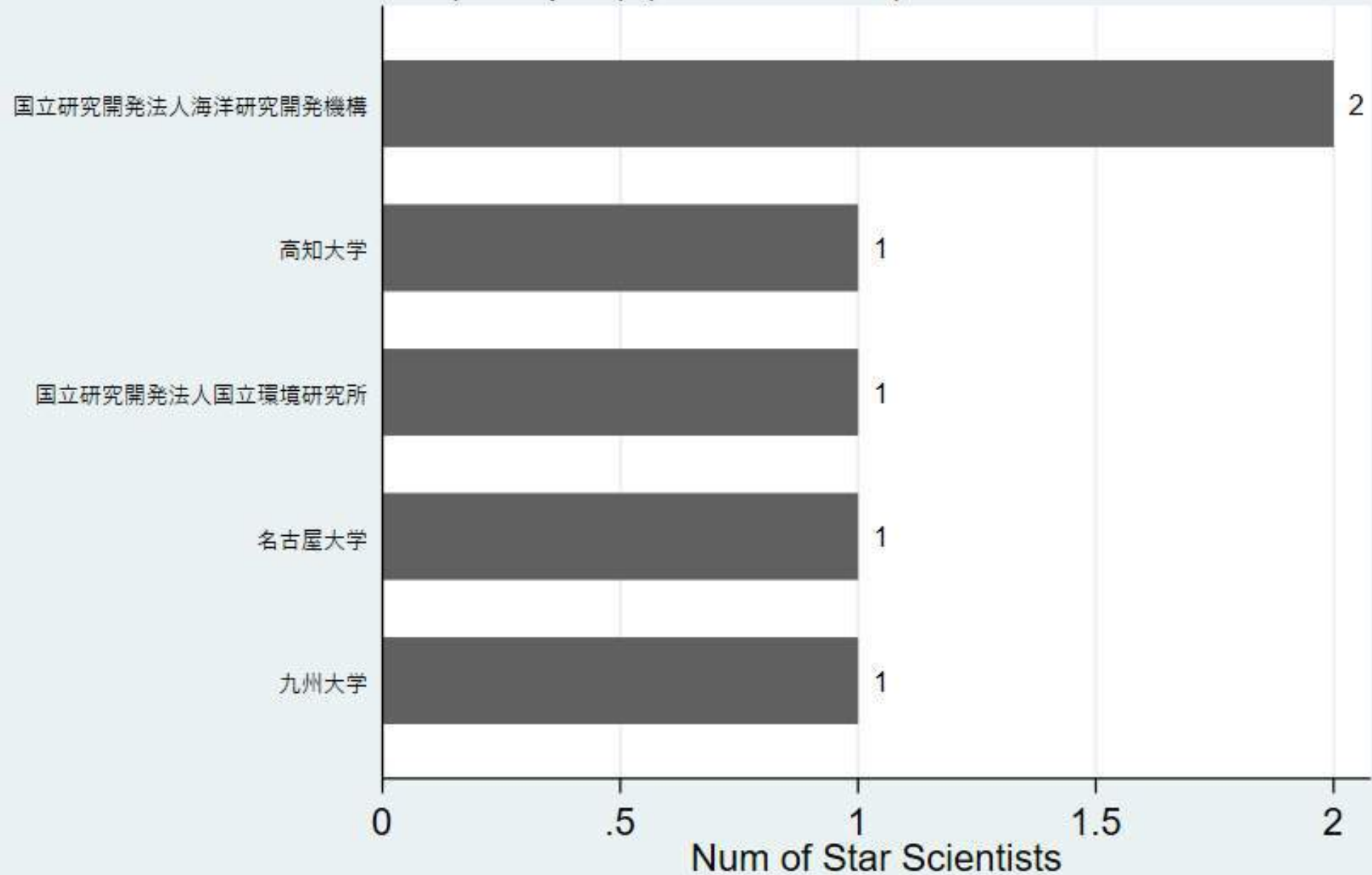
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Environment/Ecology)



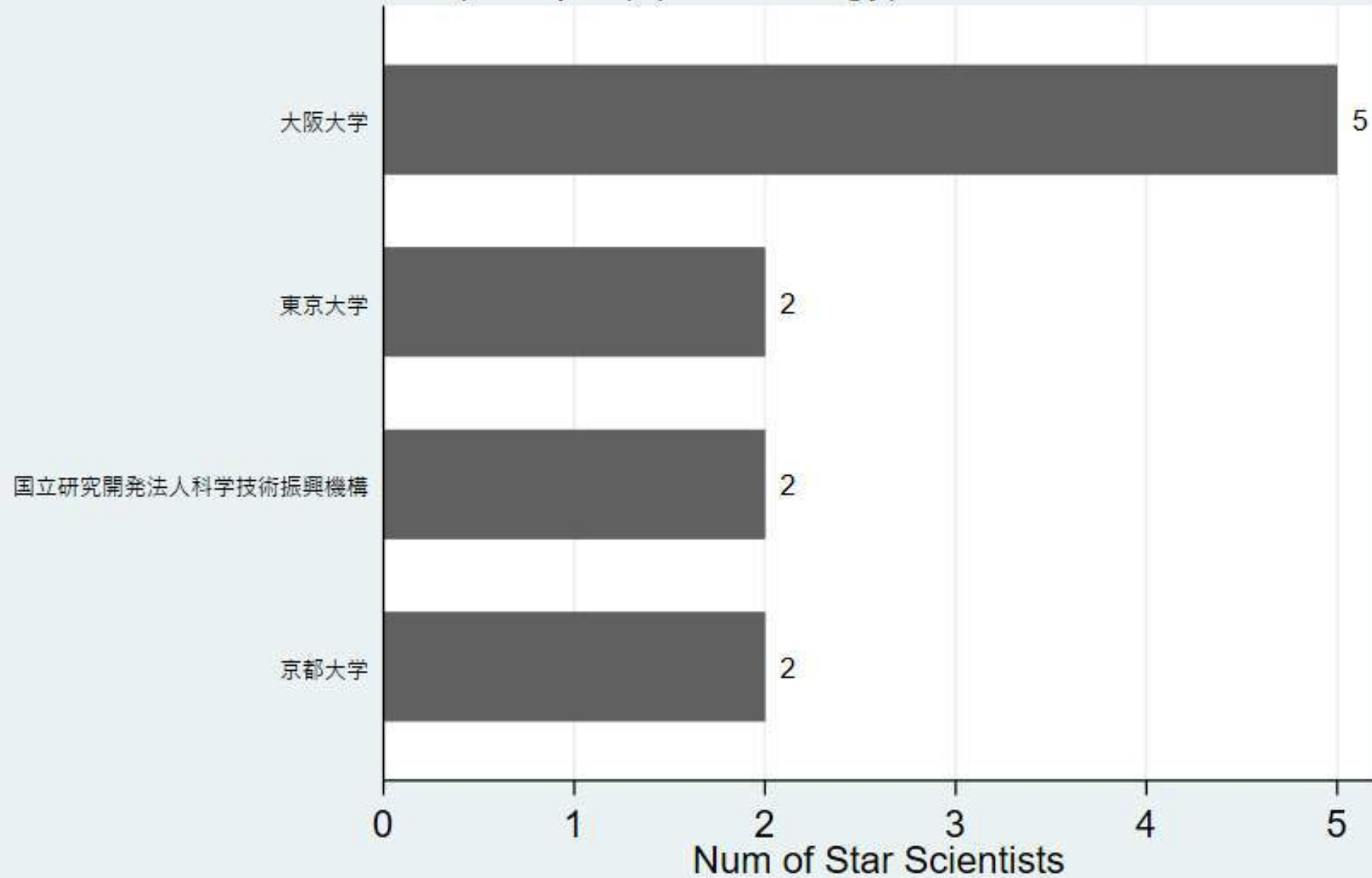
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Engineering)



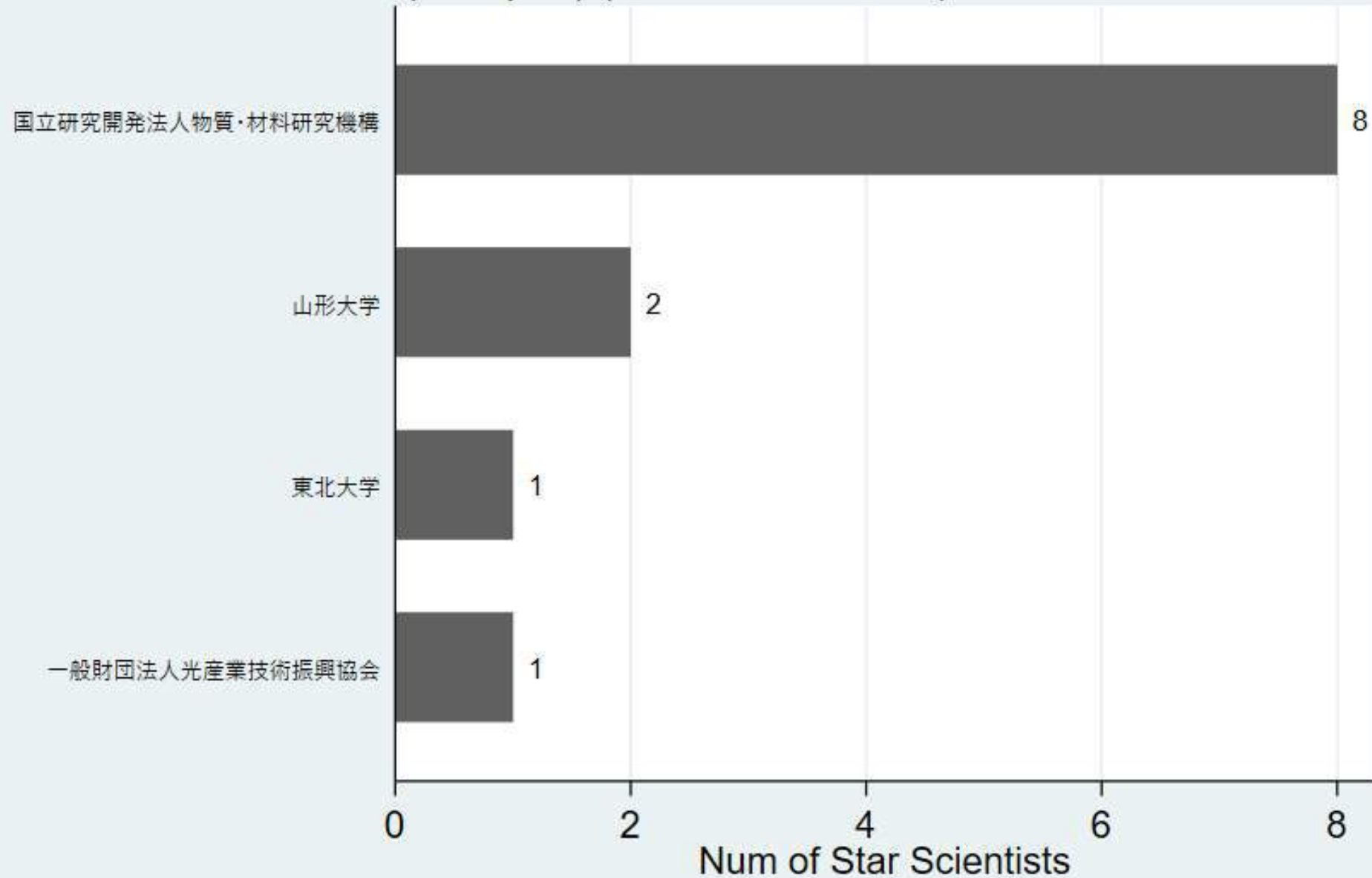
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Geosciences)



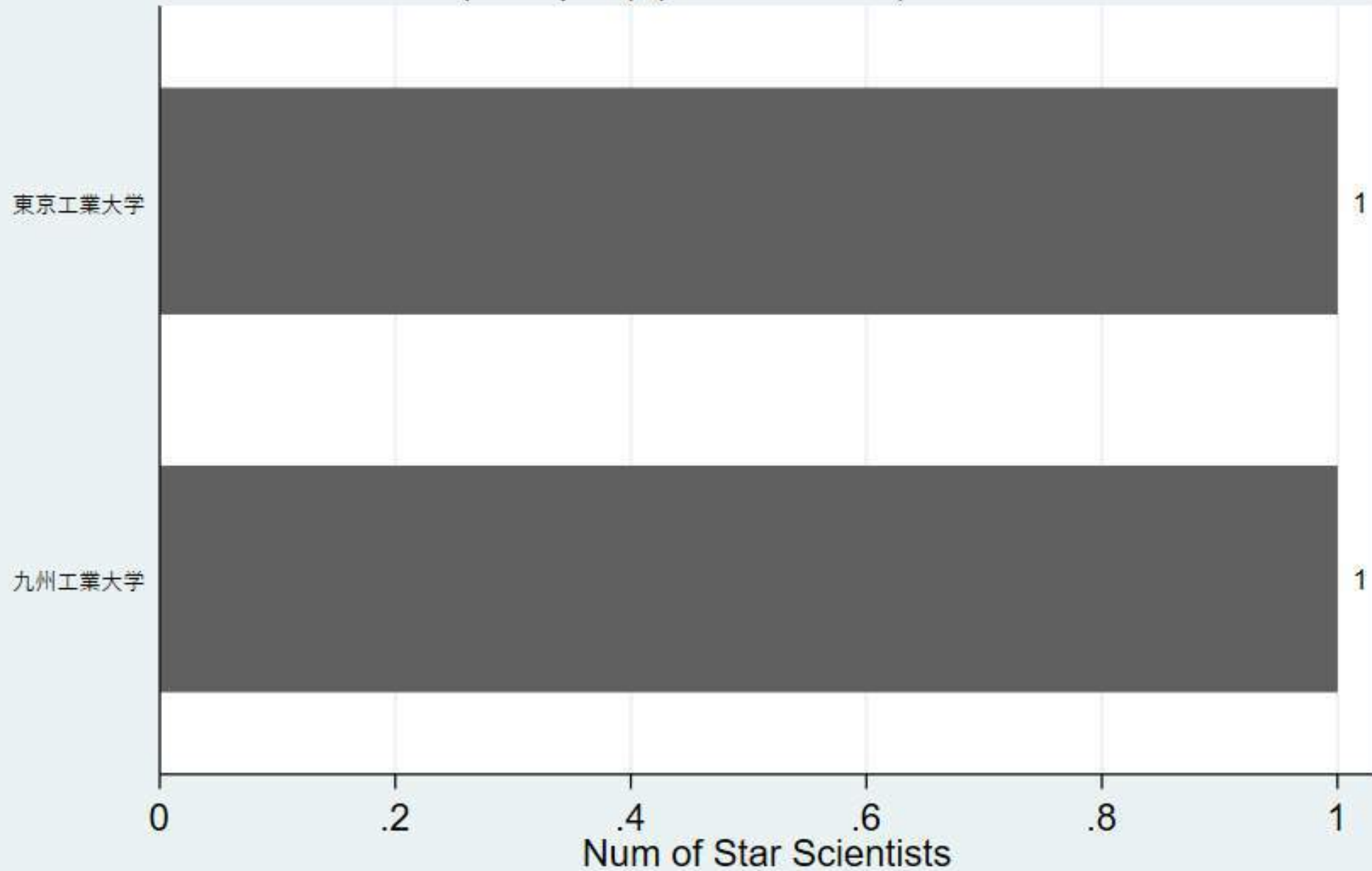
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Immunology)



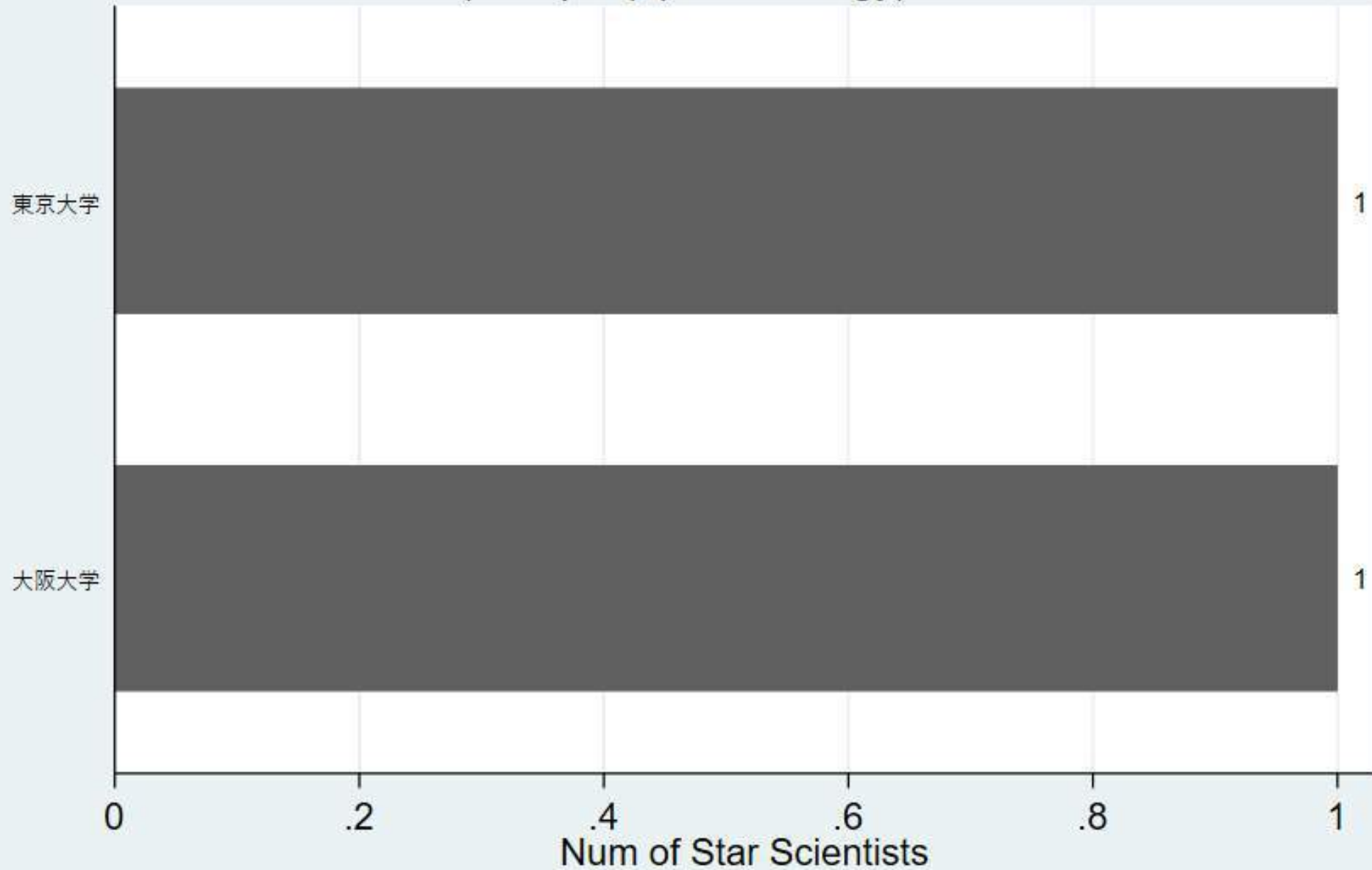
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Materials Science)



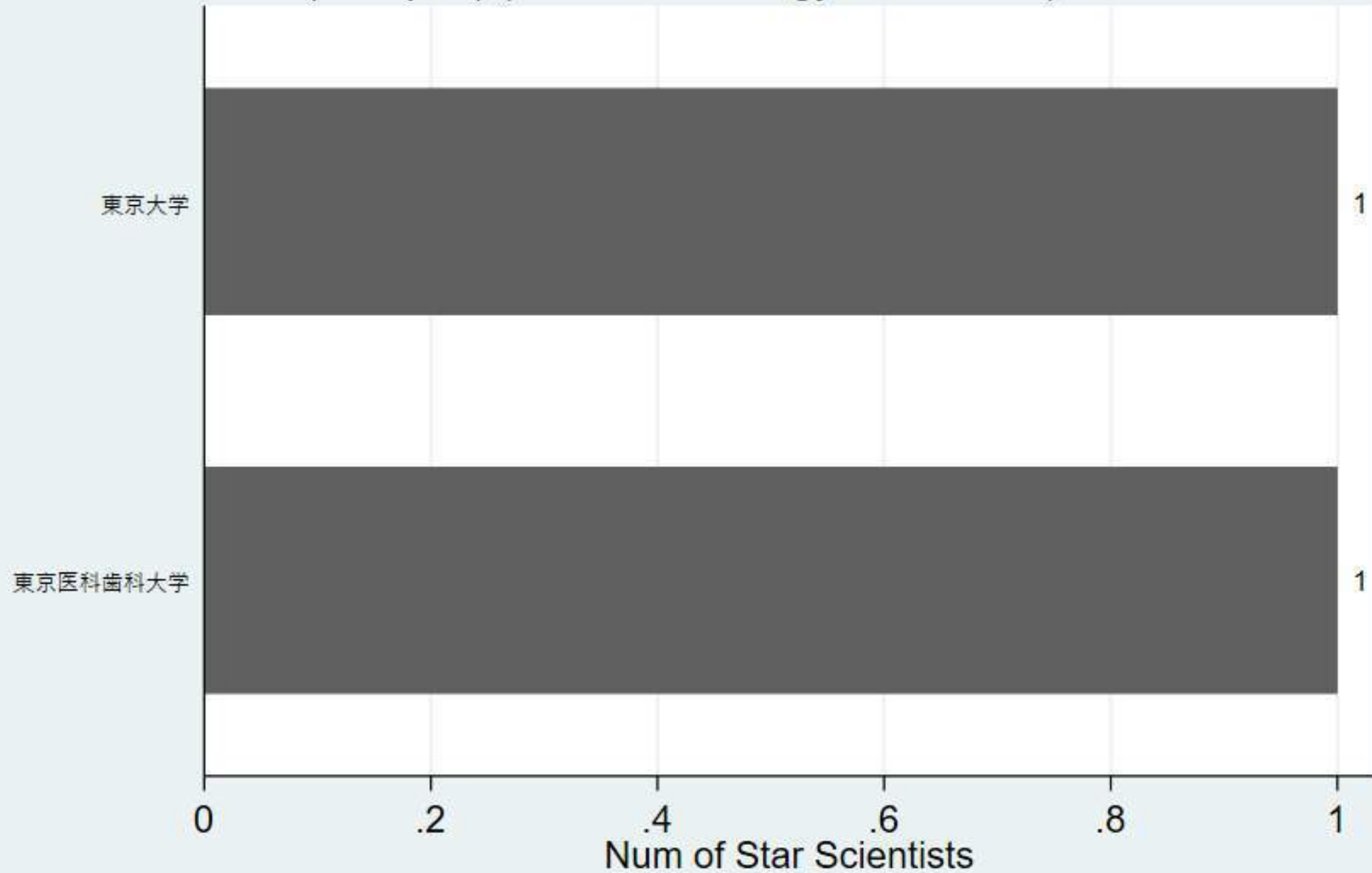
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Mathematics)



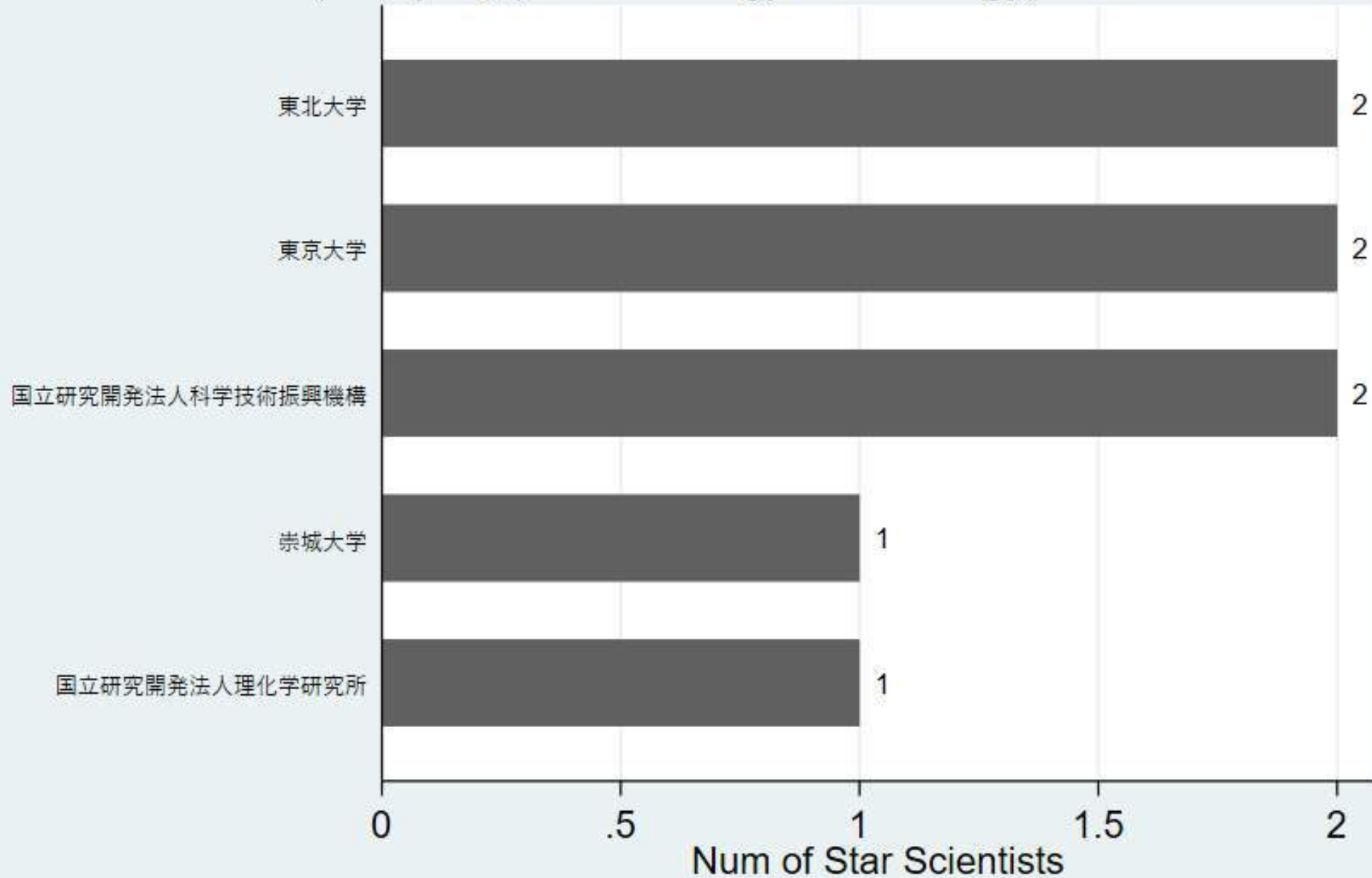
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Microbiology)



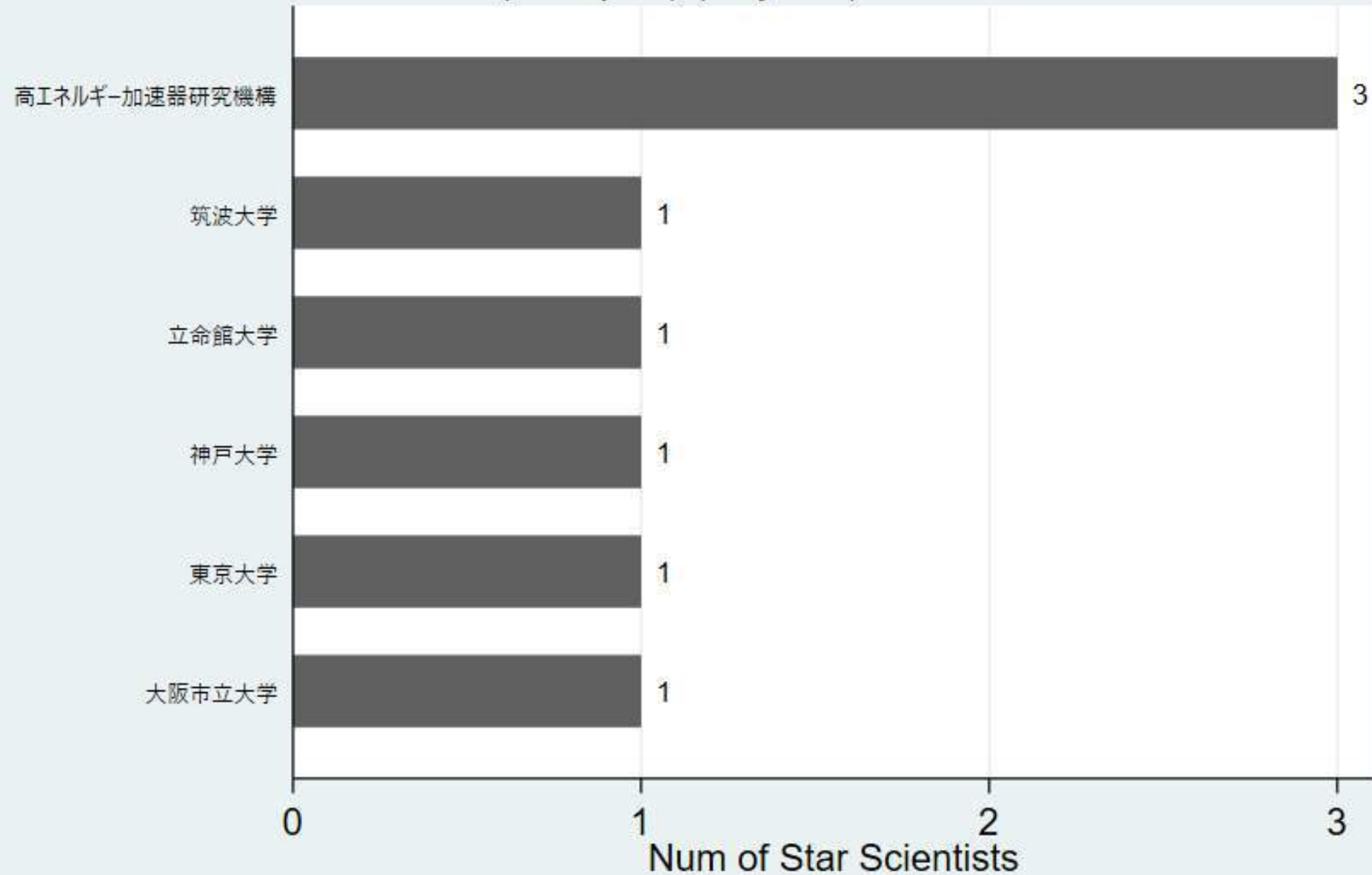
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Molecular Biology & Genetics)



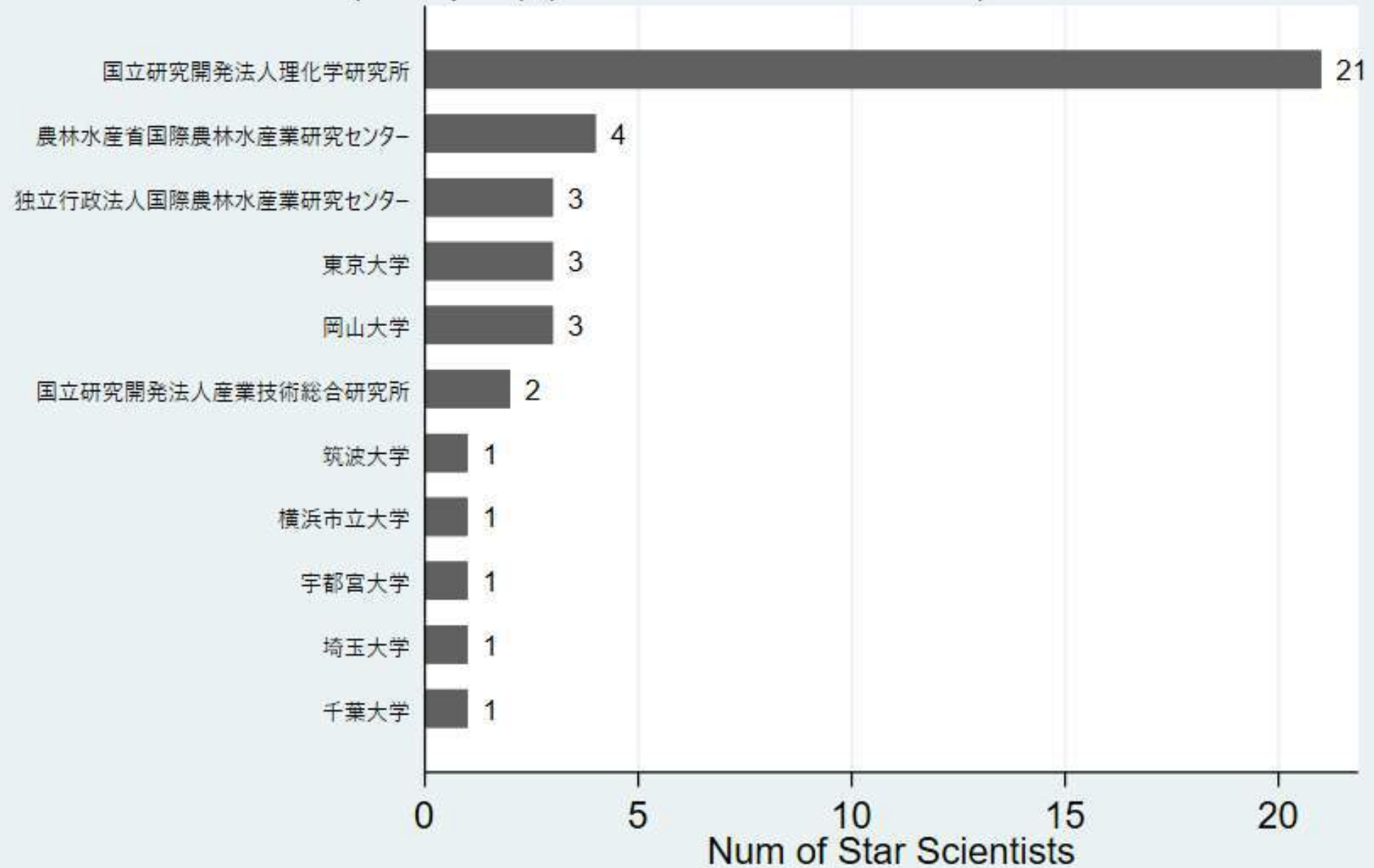
Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Pharmacology & Toxicology)



Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Physics)

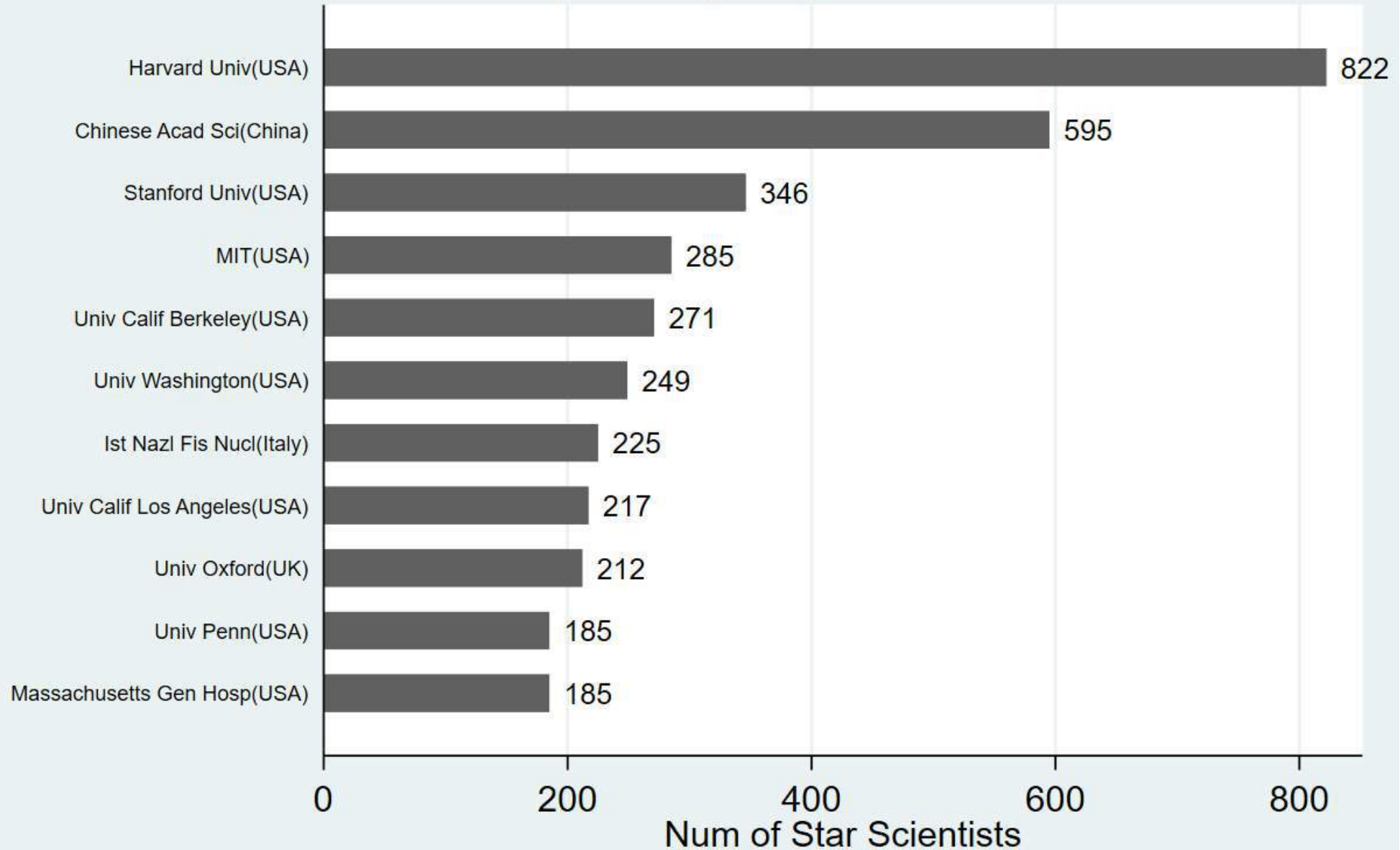


Ranking of Organizations by Num of Star Scientists(Short List) (In Japan) (Plant & Animal Science)

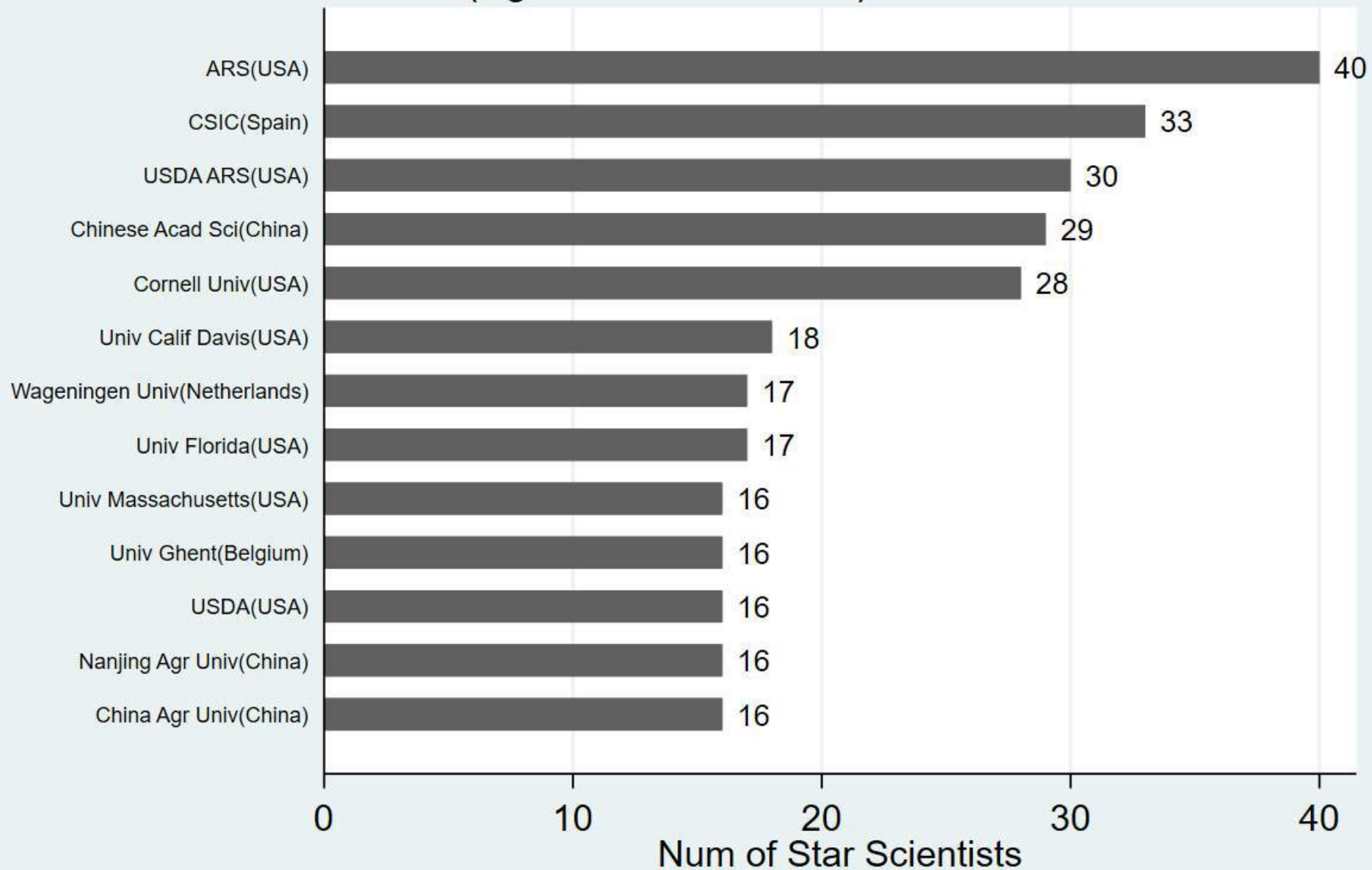


2-3. Ranking of Organizations by Num of Star Scientists(Long List)

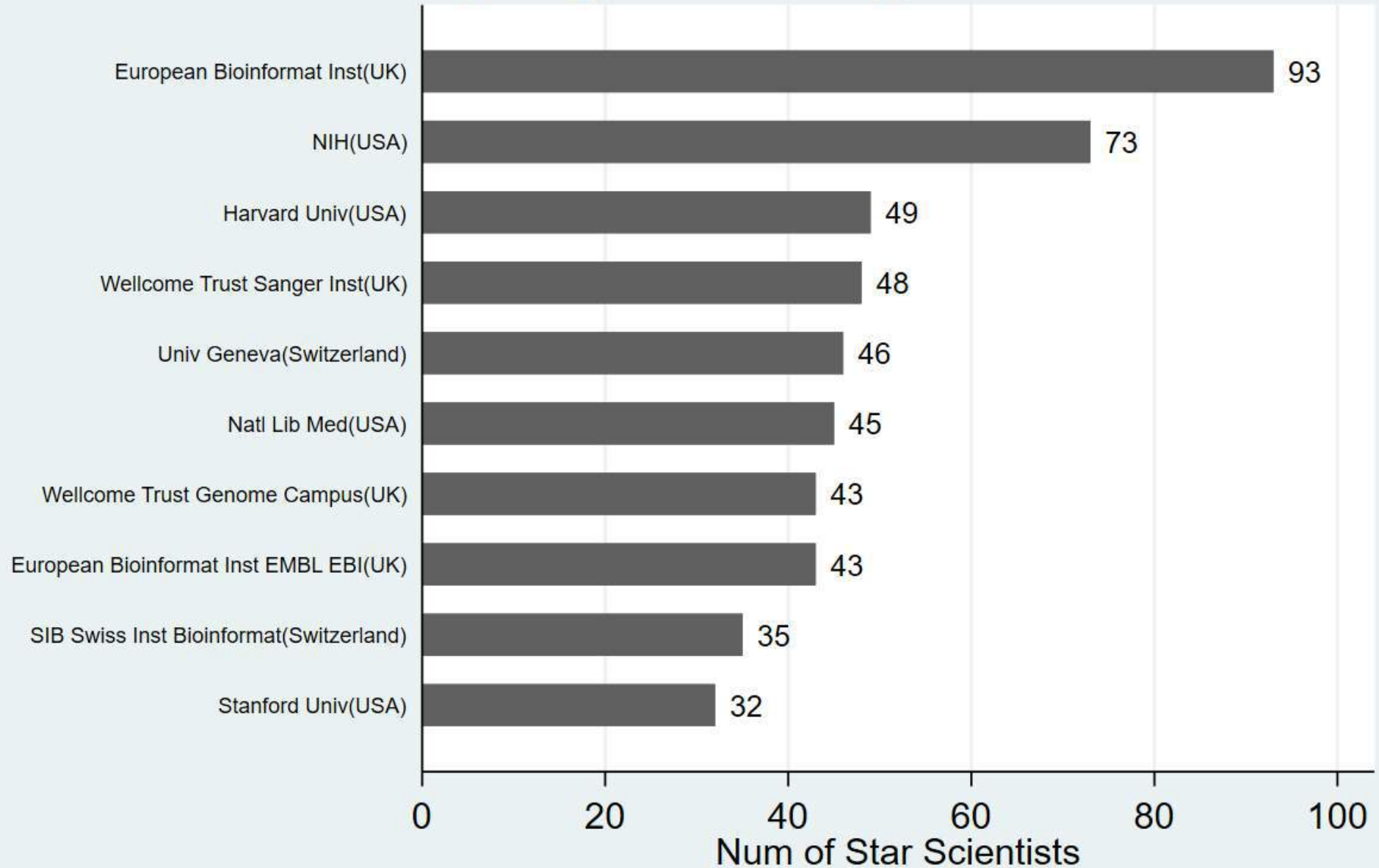
Ranking of Organizations by Num of Star Scientists(Long List) (All Categories)



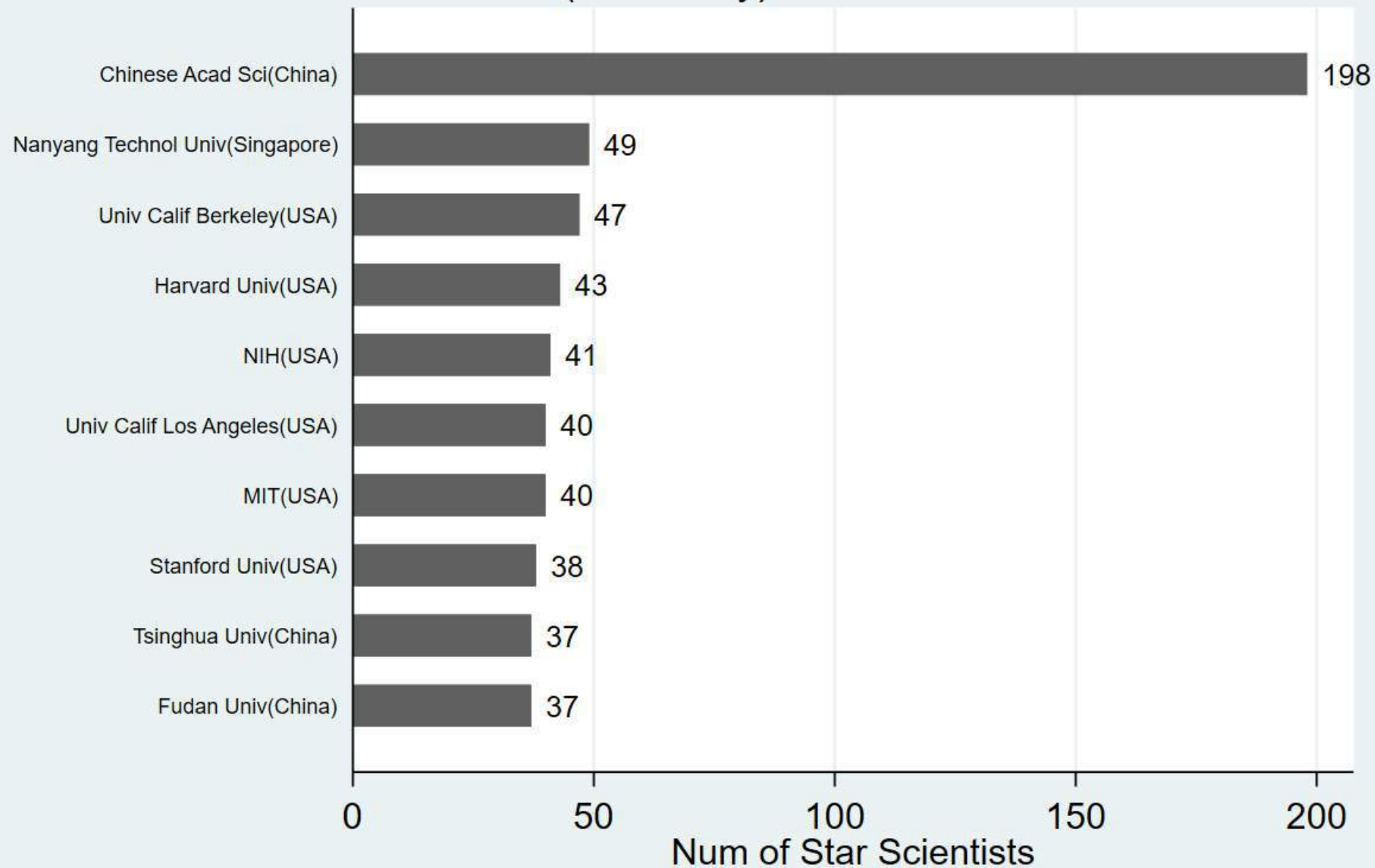
Ranking of Organizations by Num of Star Scientists(Long List) (Agricultural Sciences)



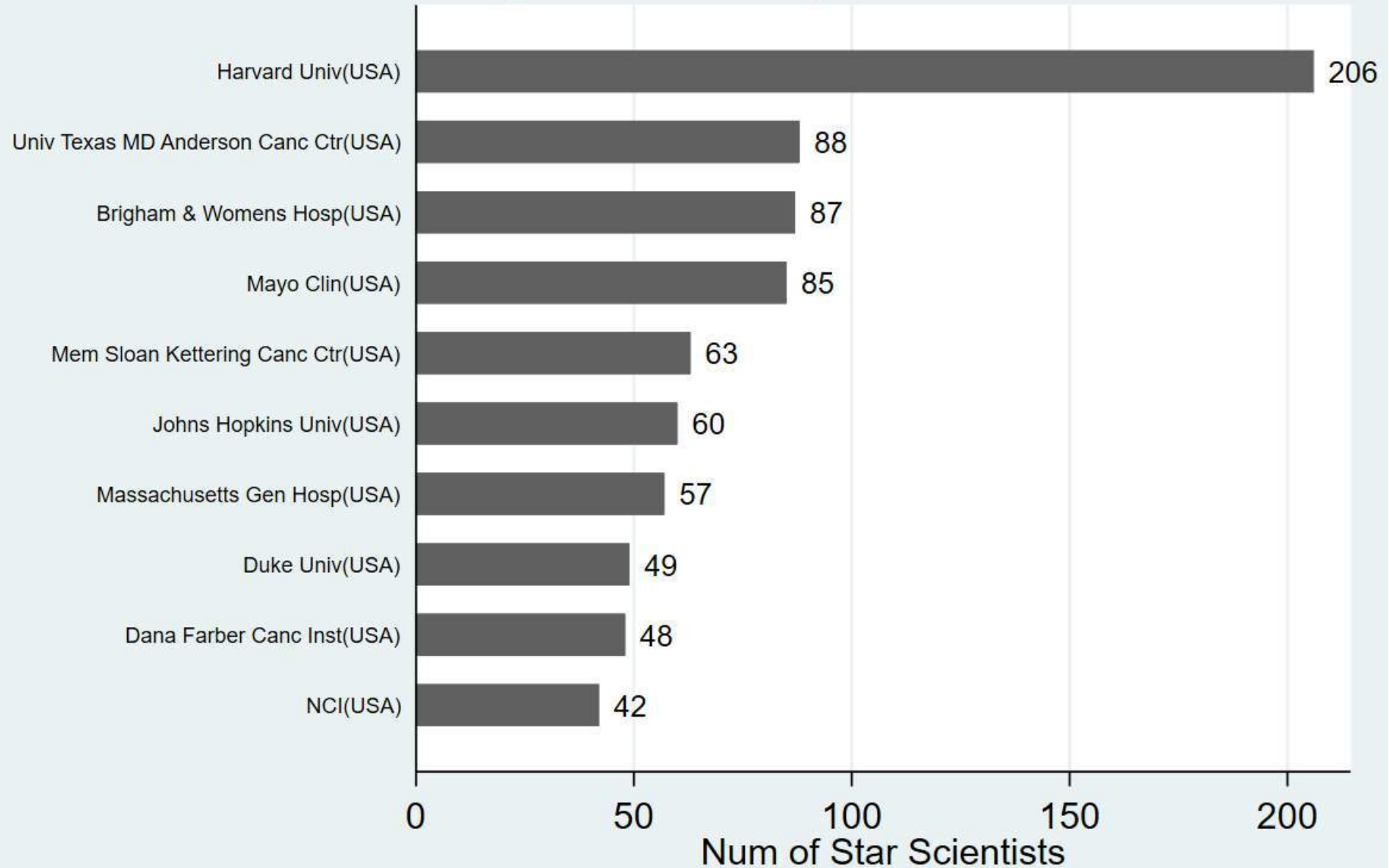
Ranking of Organizations by Num of Star Scientists(Long List) (Biology & Biochemistry)



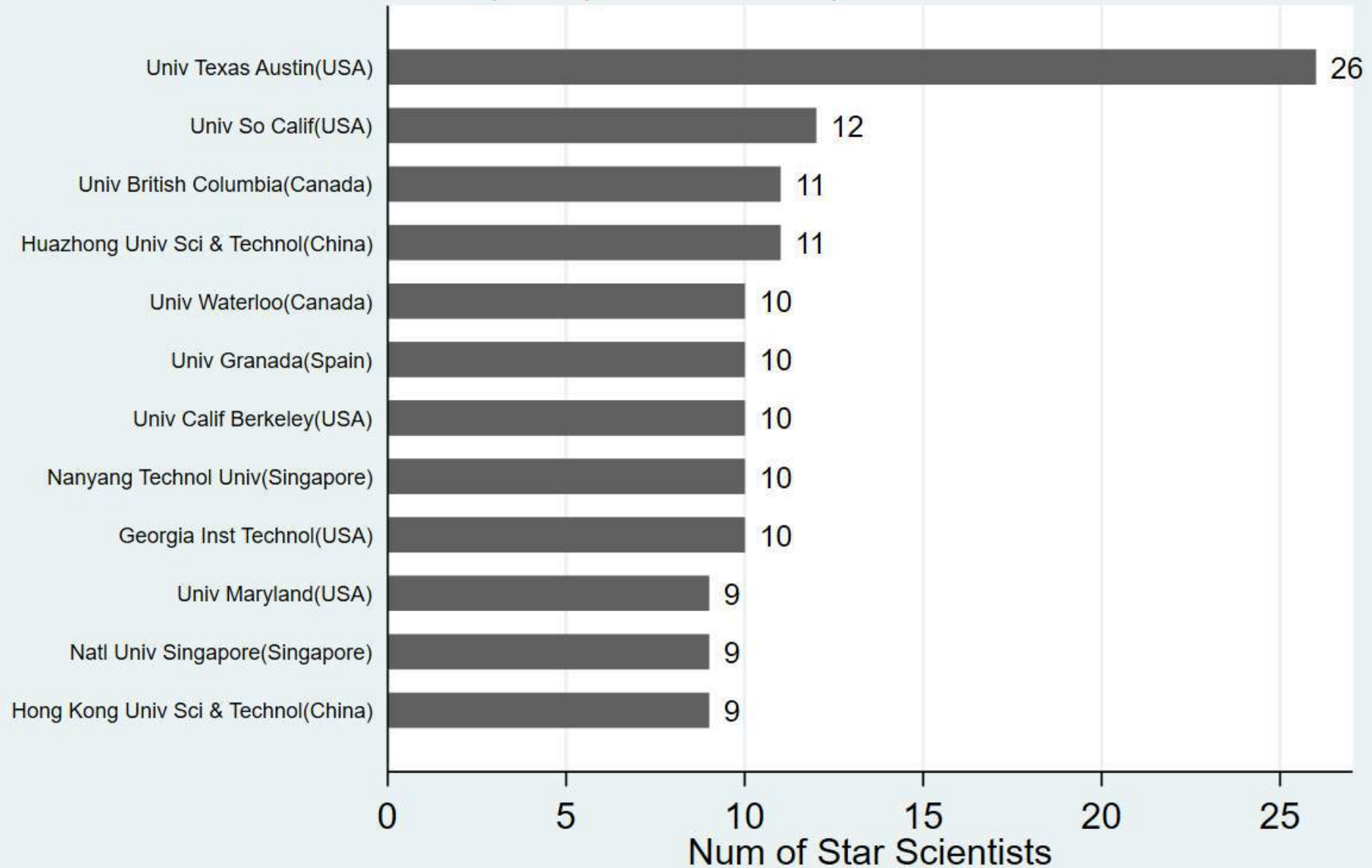
Ranking of Organizations by Num of Star Scientists(Long List) (Chemistry)



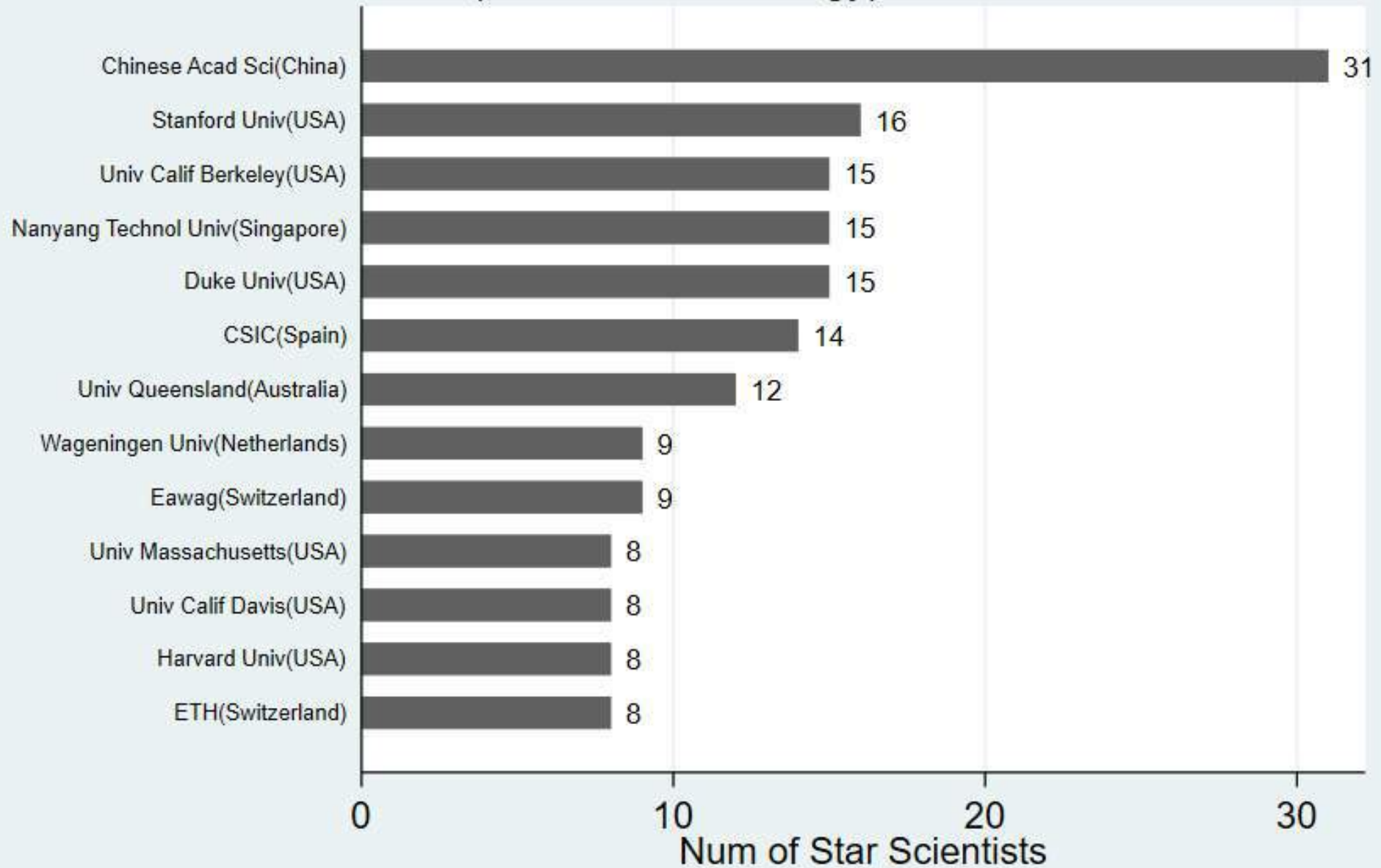
Ranking of Organizations by Num of Star Scientists(Long List) (Clinical Medicine)



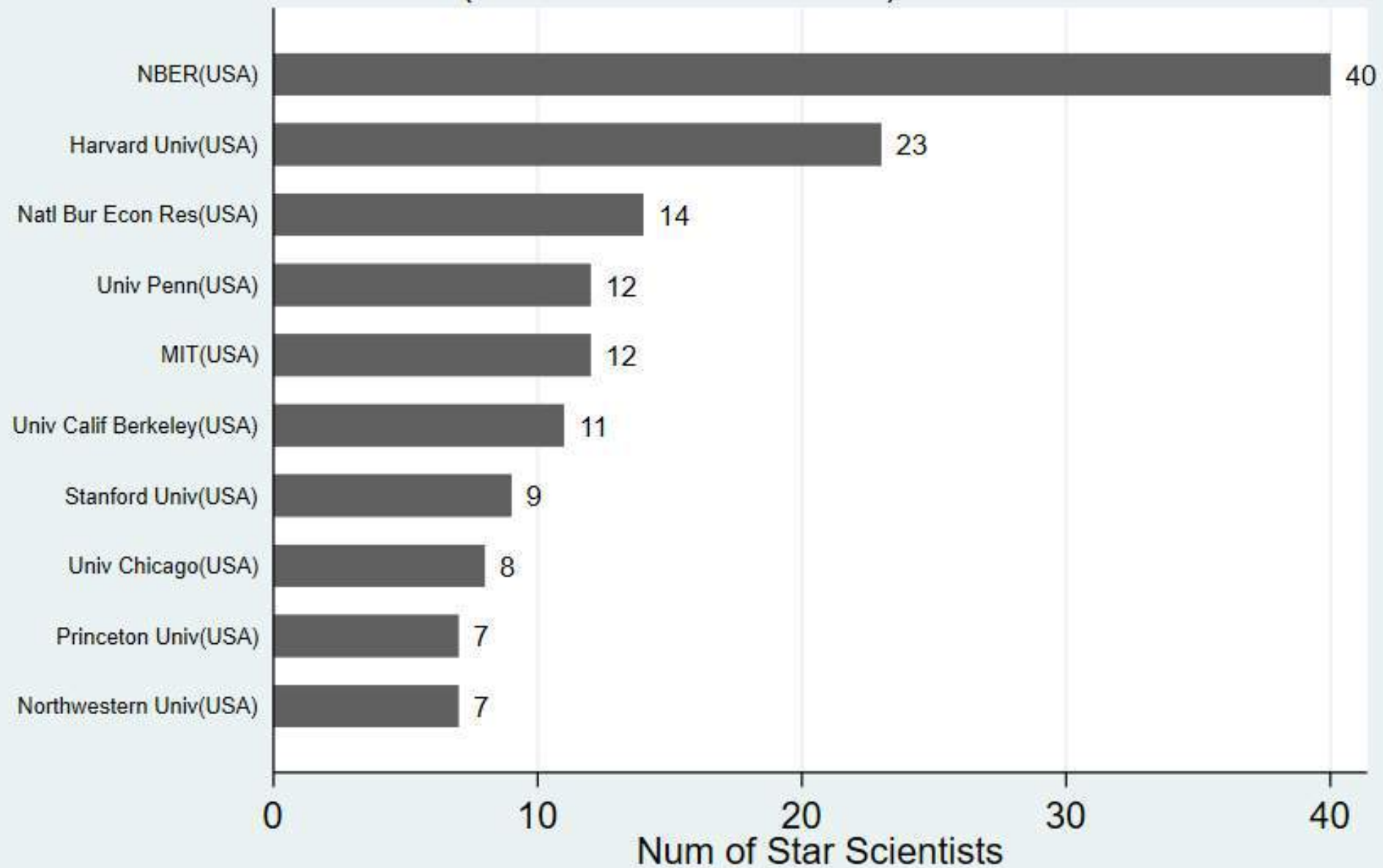
Ranking of Organizations by Num of Star Scientists(Long List) (Computer Science)



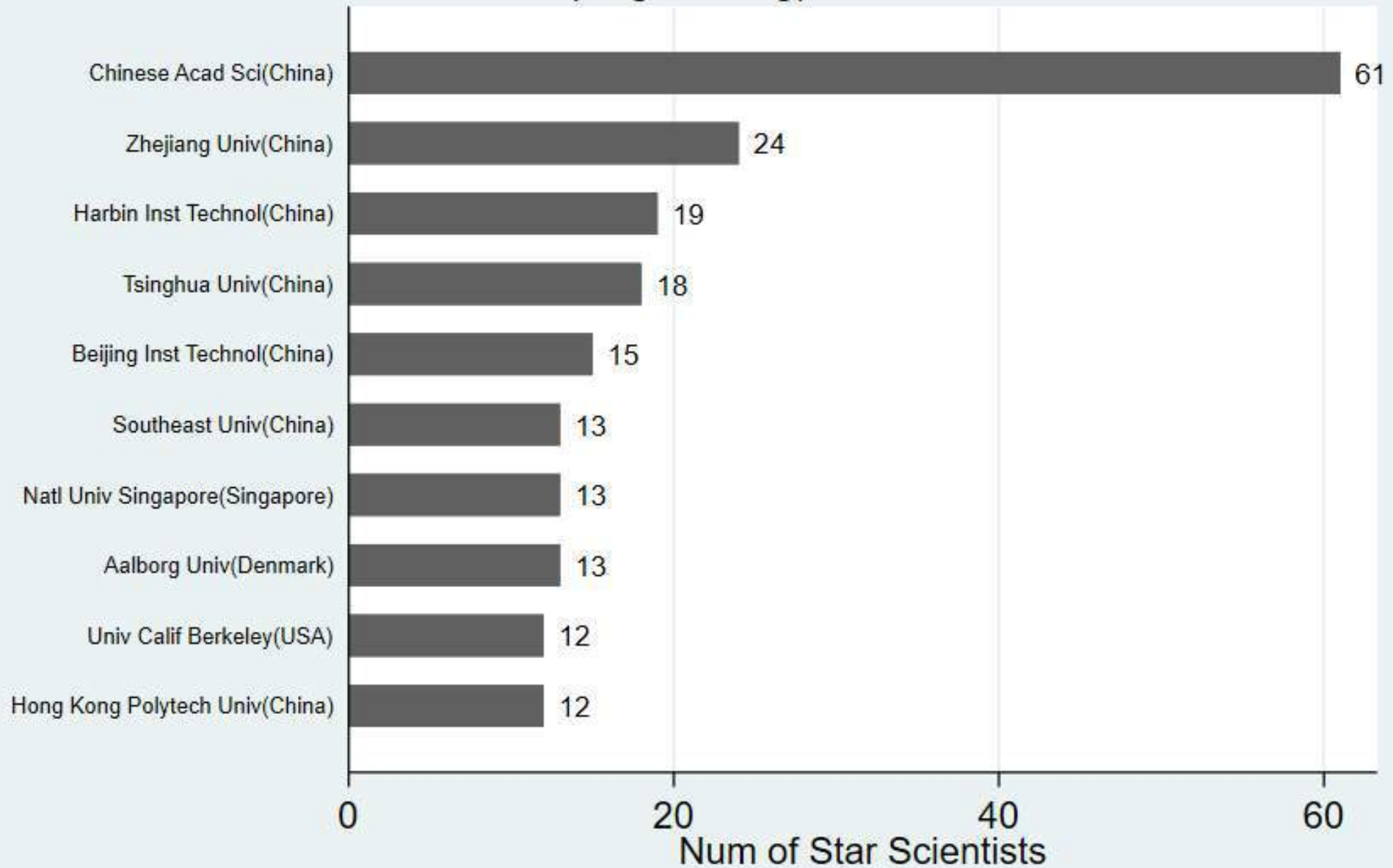
Ranking of Organizations by Num of Star Scientists(Long List) (Environment/Ecology)



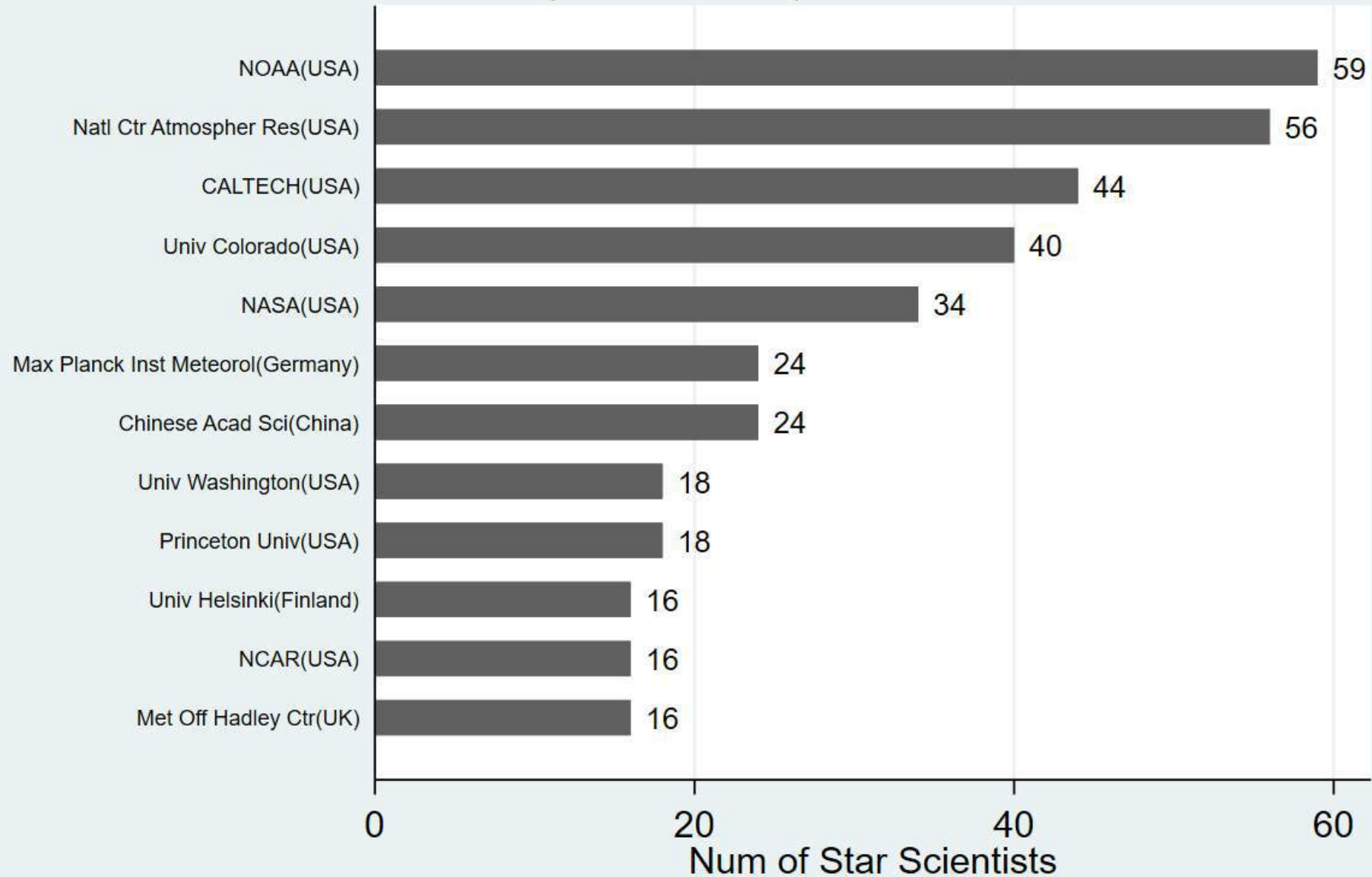
Ranking of Organizations by Num of Star Scientists(Long List) (Economics & Business)



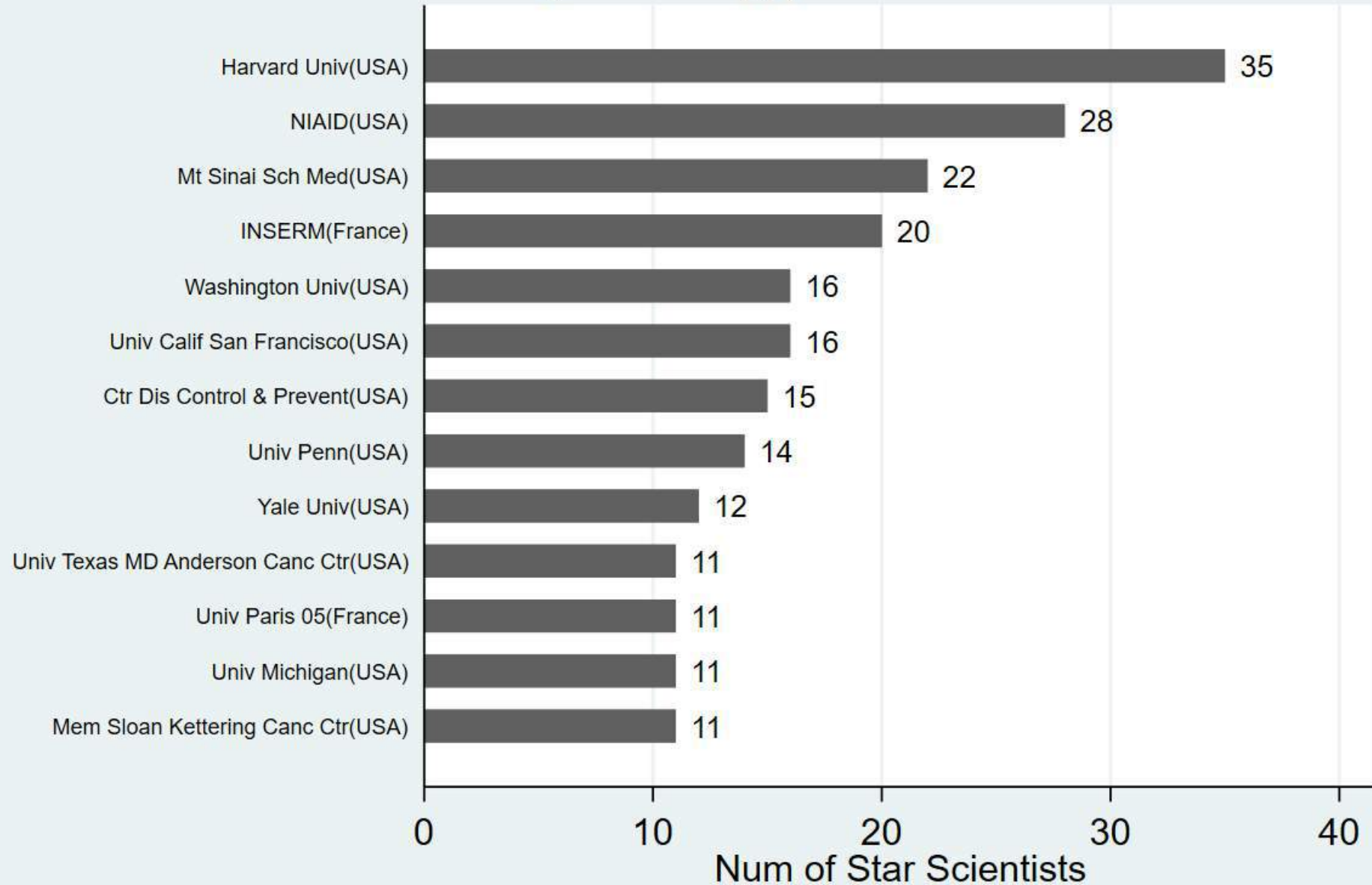
Ranking of Organizations by Num of Star Scientists(Long List) (Engineering)



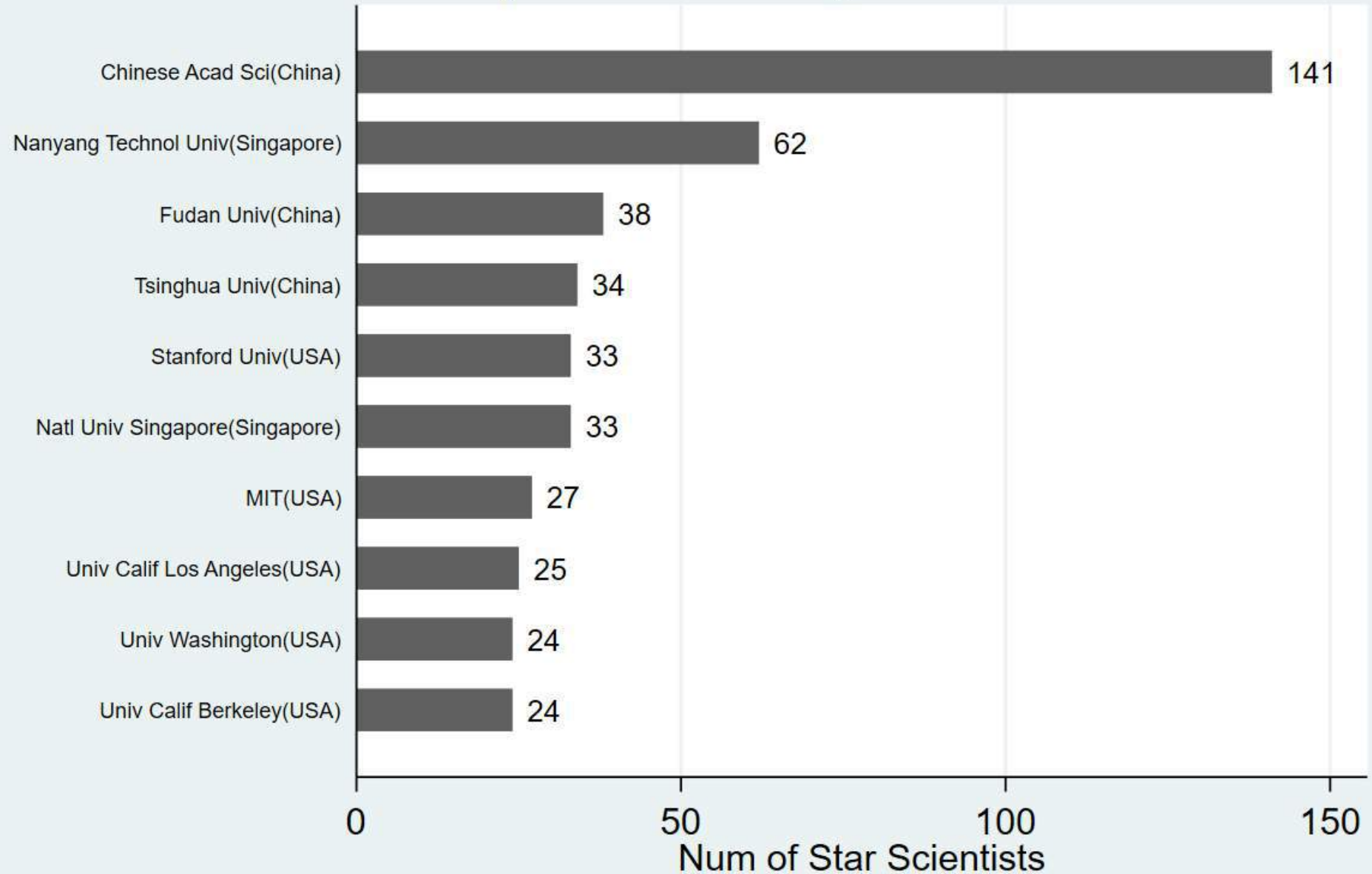
Ranking of Organizations by Num of Star Scientists(Long List) (Geosciences)



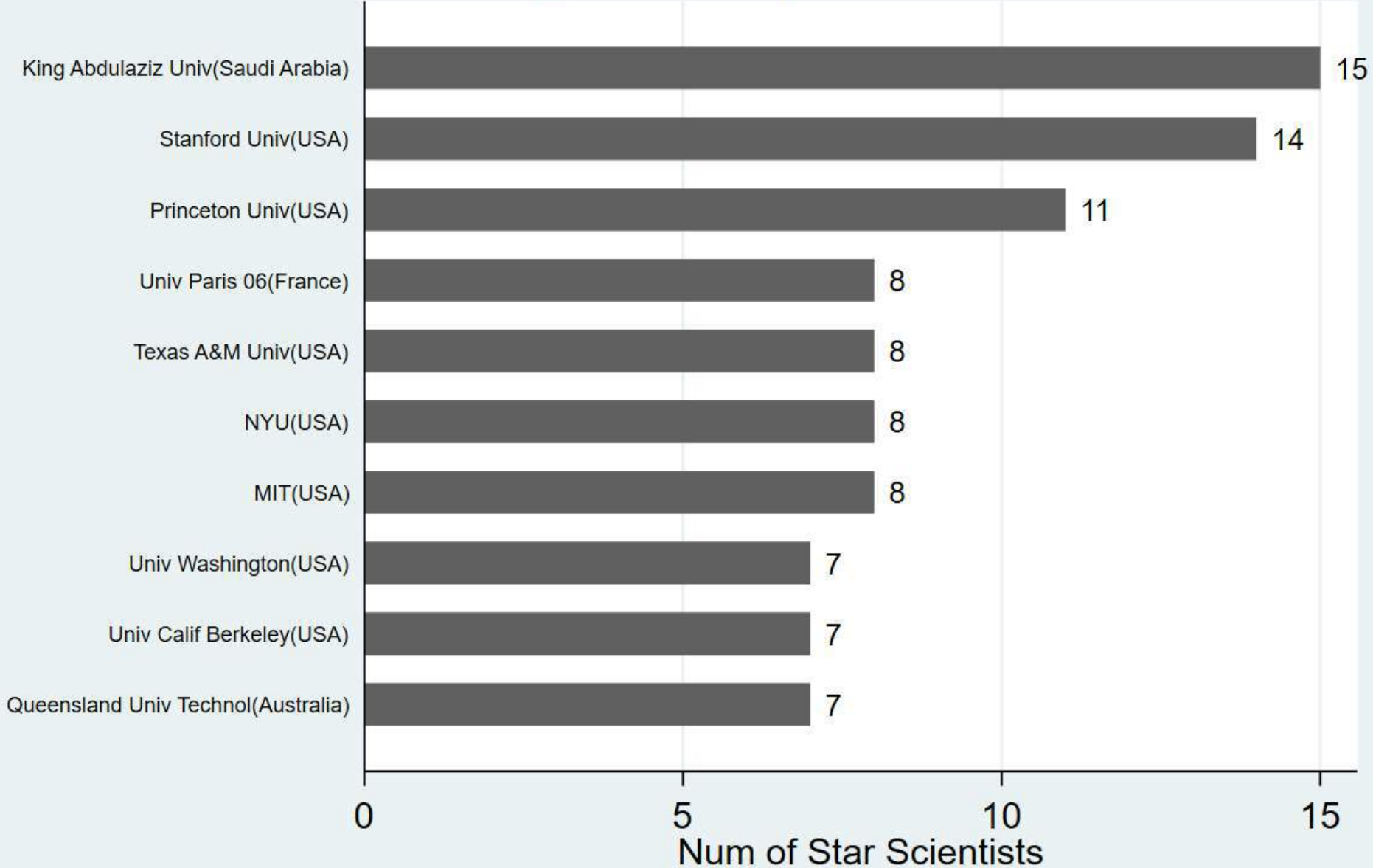
Ranking of Organizations by Num of Star Scientists(Long List) (Immunology)



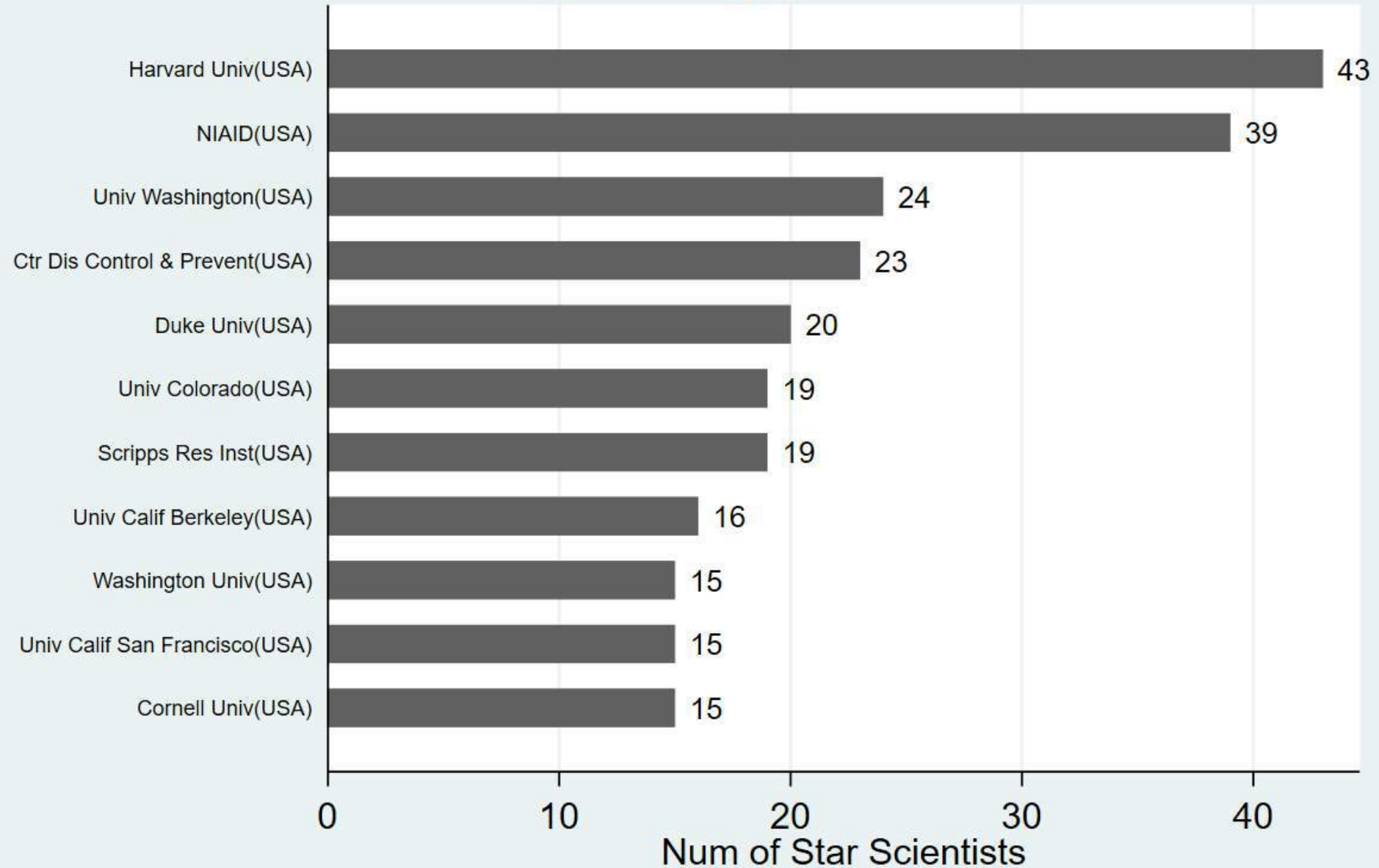
Ranking of Organizations by Num of Star Scientists(Long List) (Materials Science)



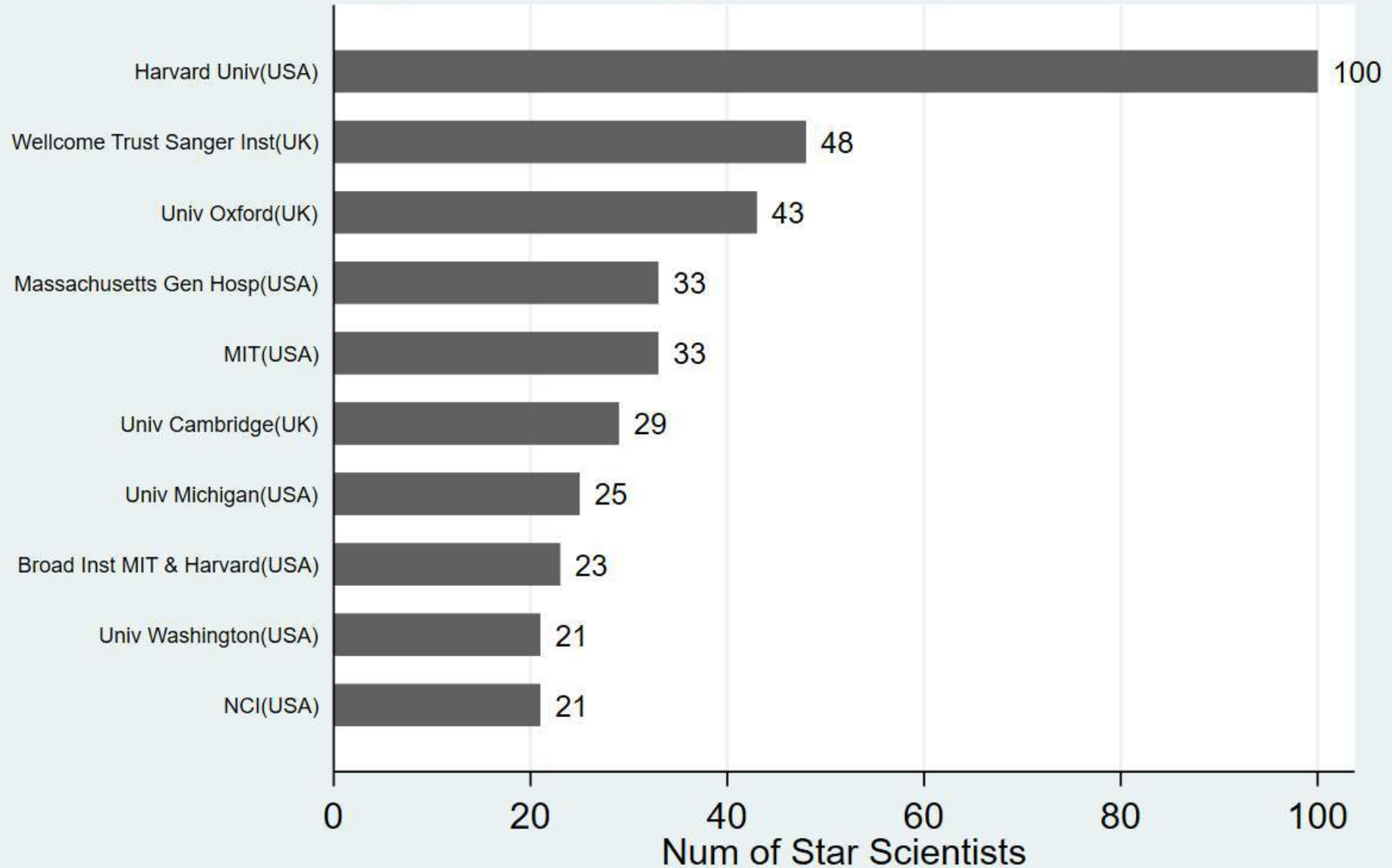
Ranking of Organizations by Num of Star Scientists(Long List) (Mathematics)



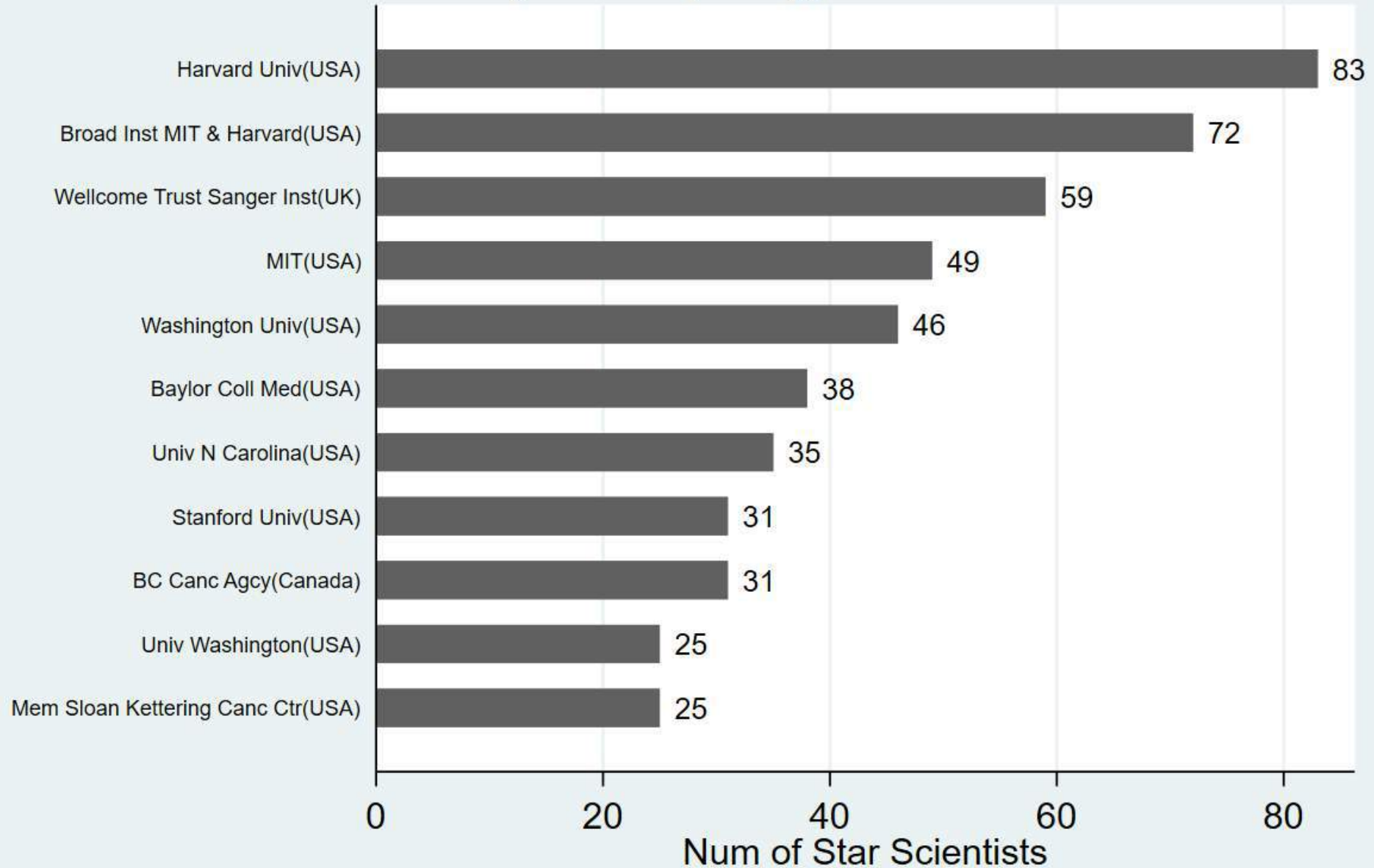
Ranking of Organizations by Num of Star Scientists(Long List) (Microbiology)



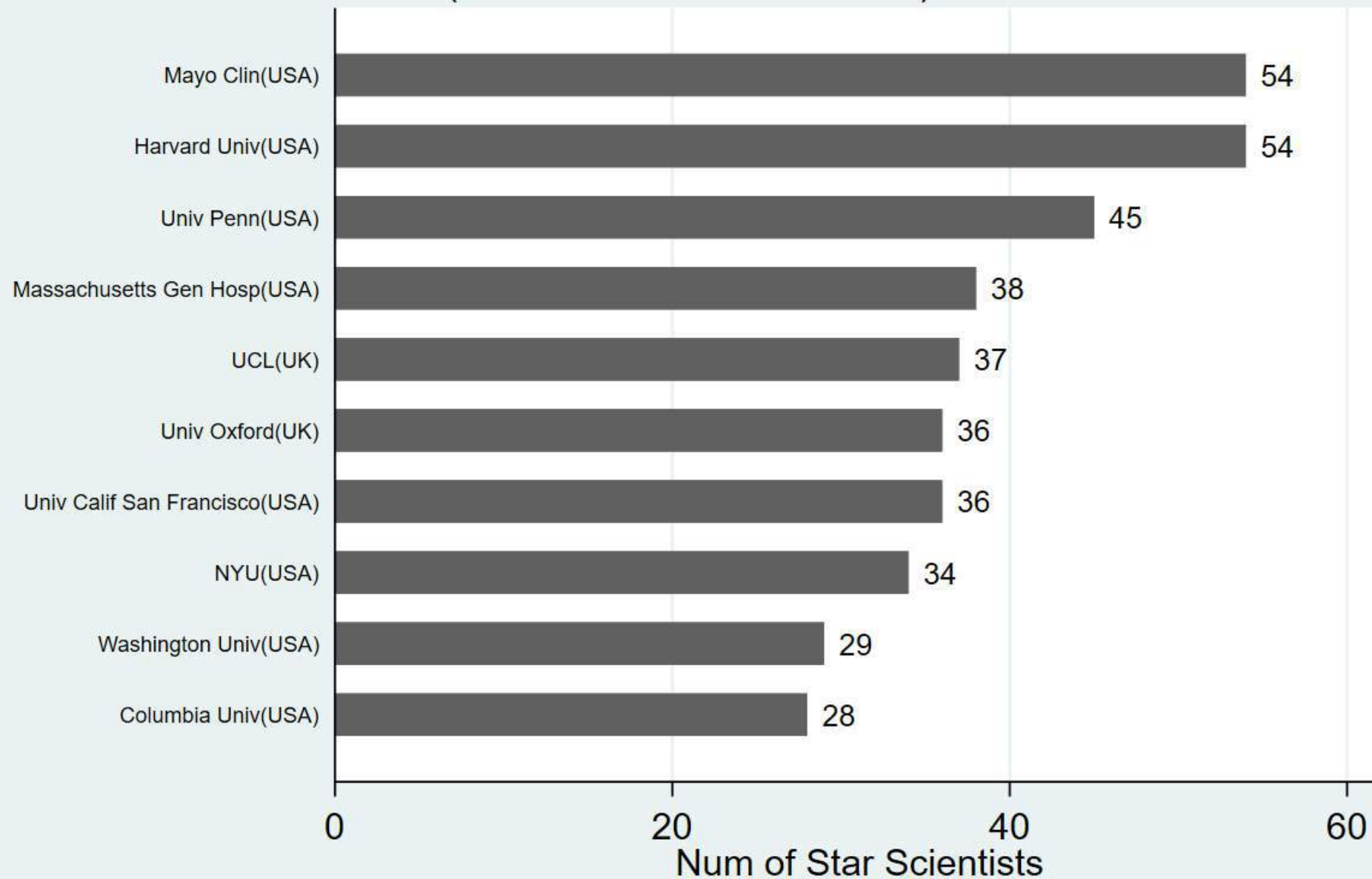
Ranking of Organizations by Num of Star Scientists(Long List) (Molecular Biology & Genetics)



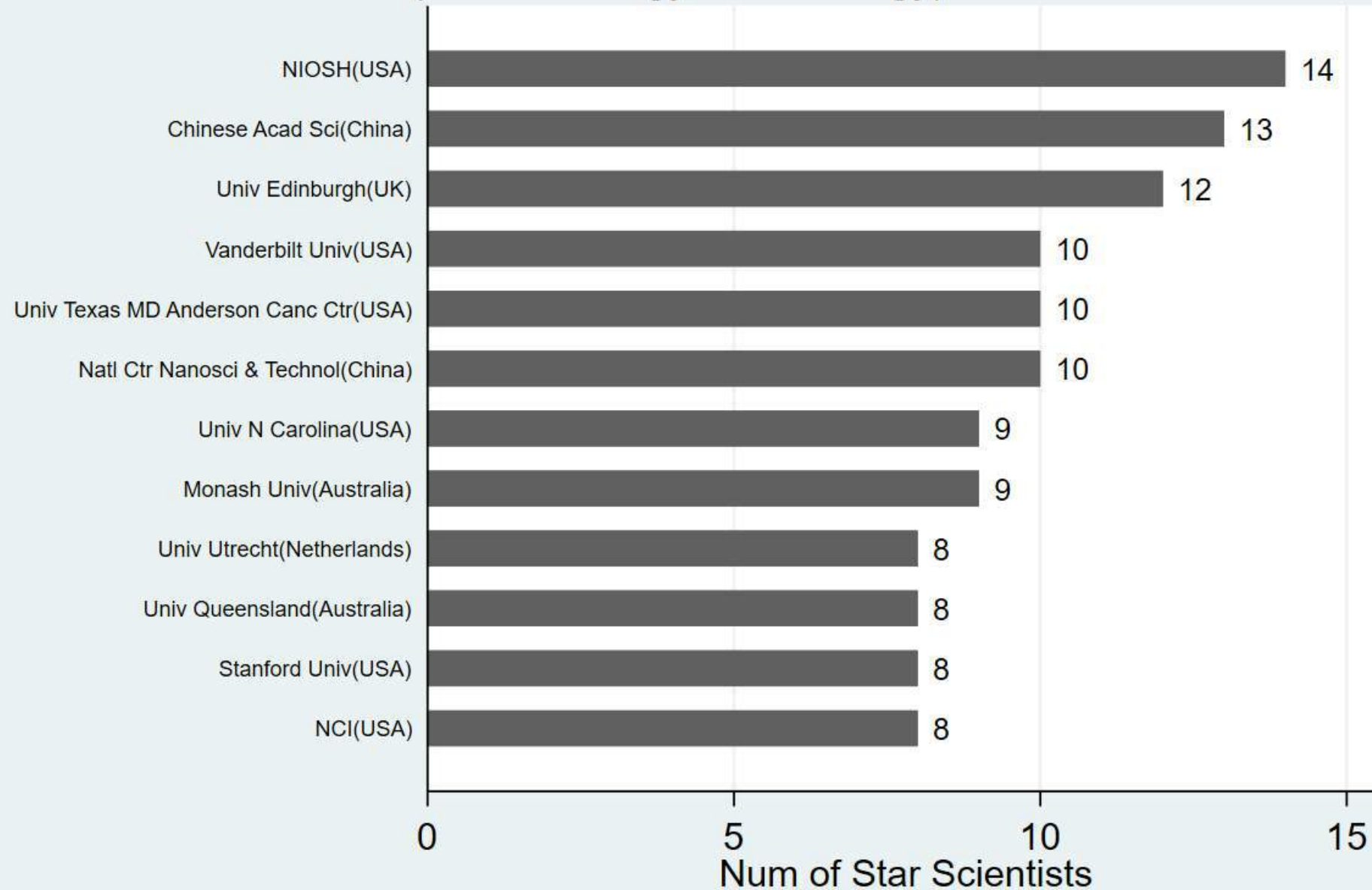
Ranking of Organizations by Num of Star Scientists(Long List) (Multidisciplinary)



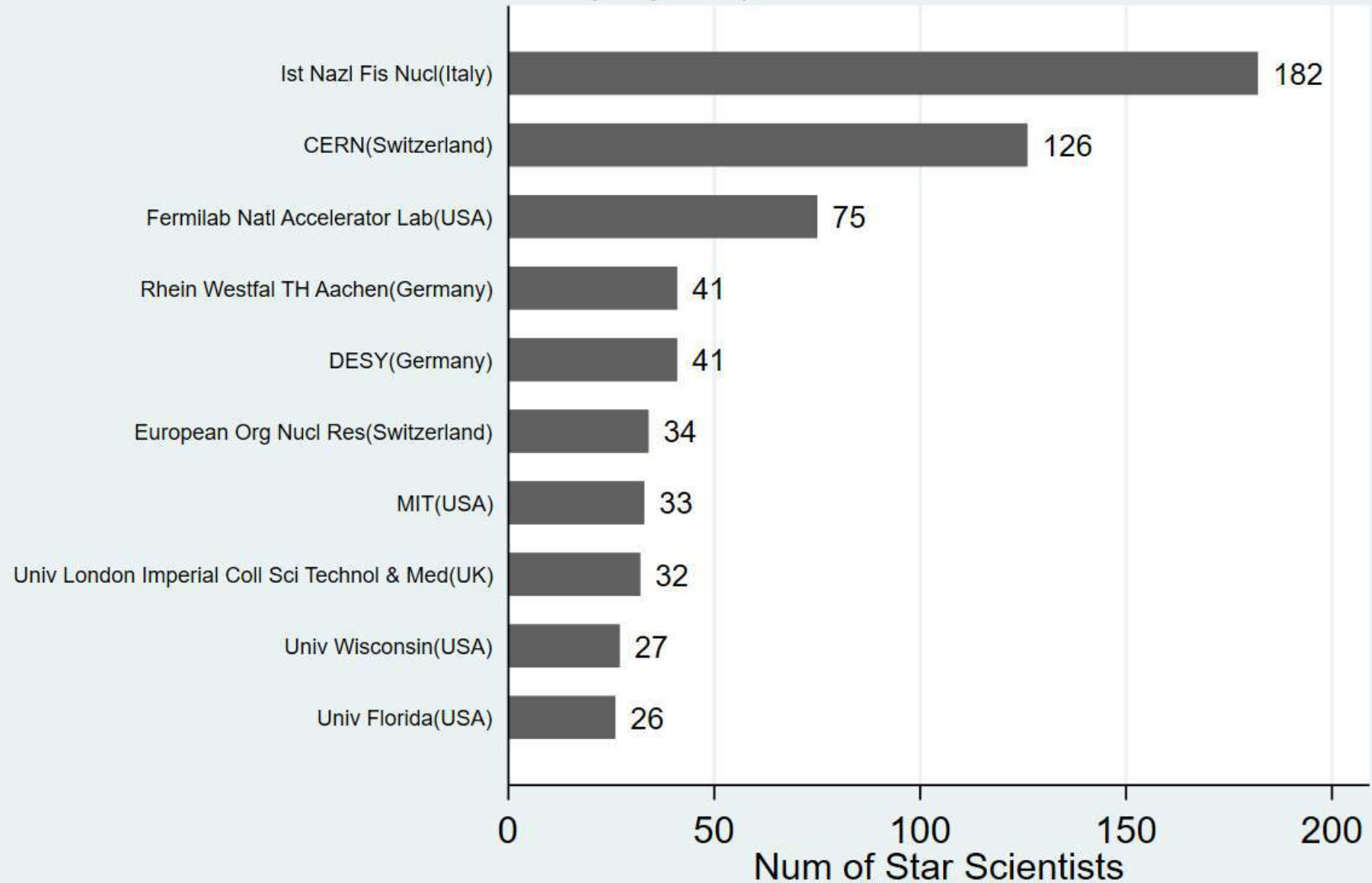
Ranking of Organizations by Num of Star Scientists(Long List) (Neuroscience & Behavior)



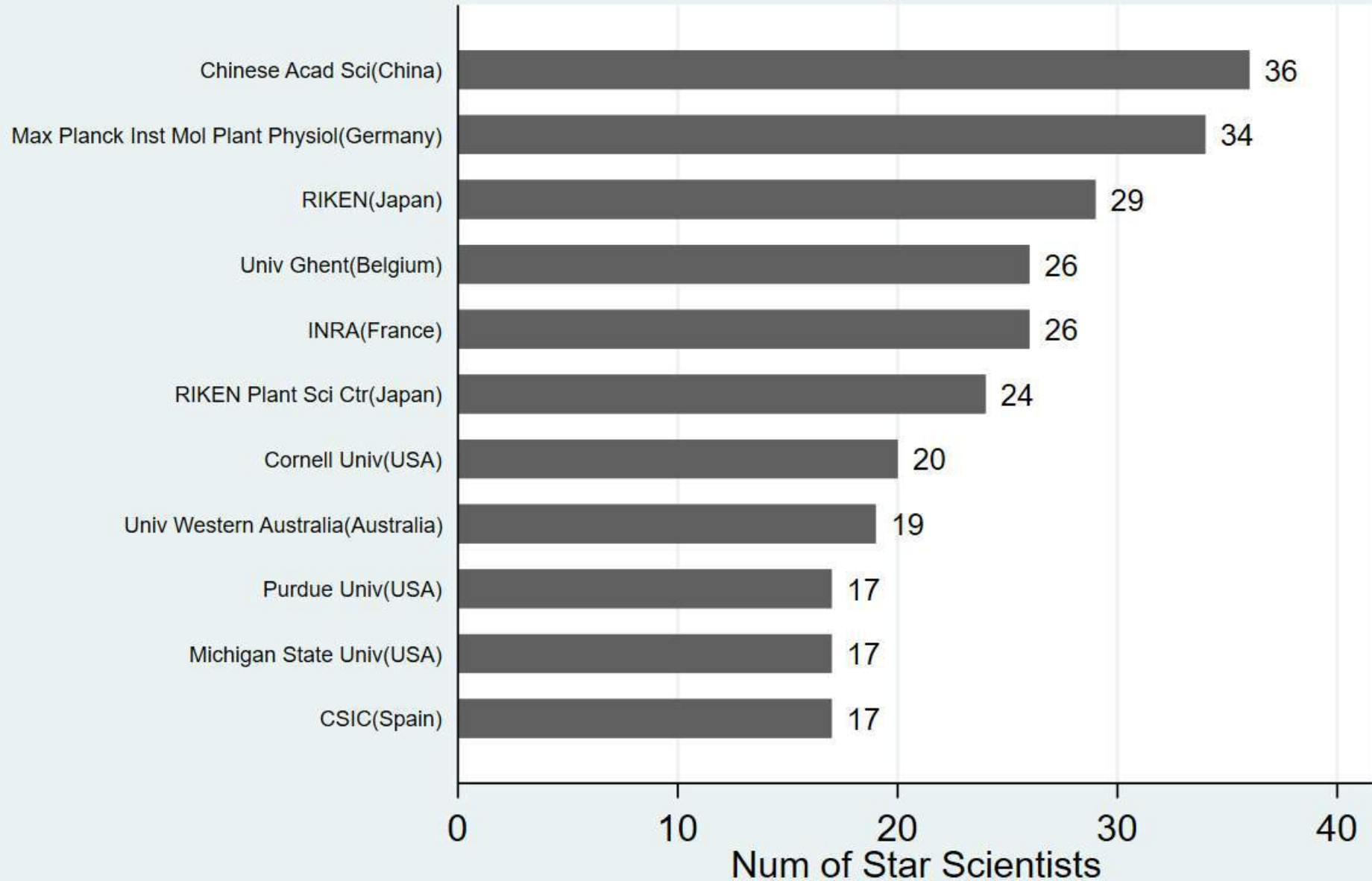
Ranking of Organizations by Num of Star Scientists(Long List) (Pharmacology & Toxicology)



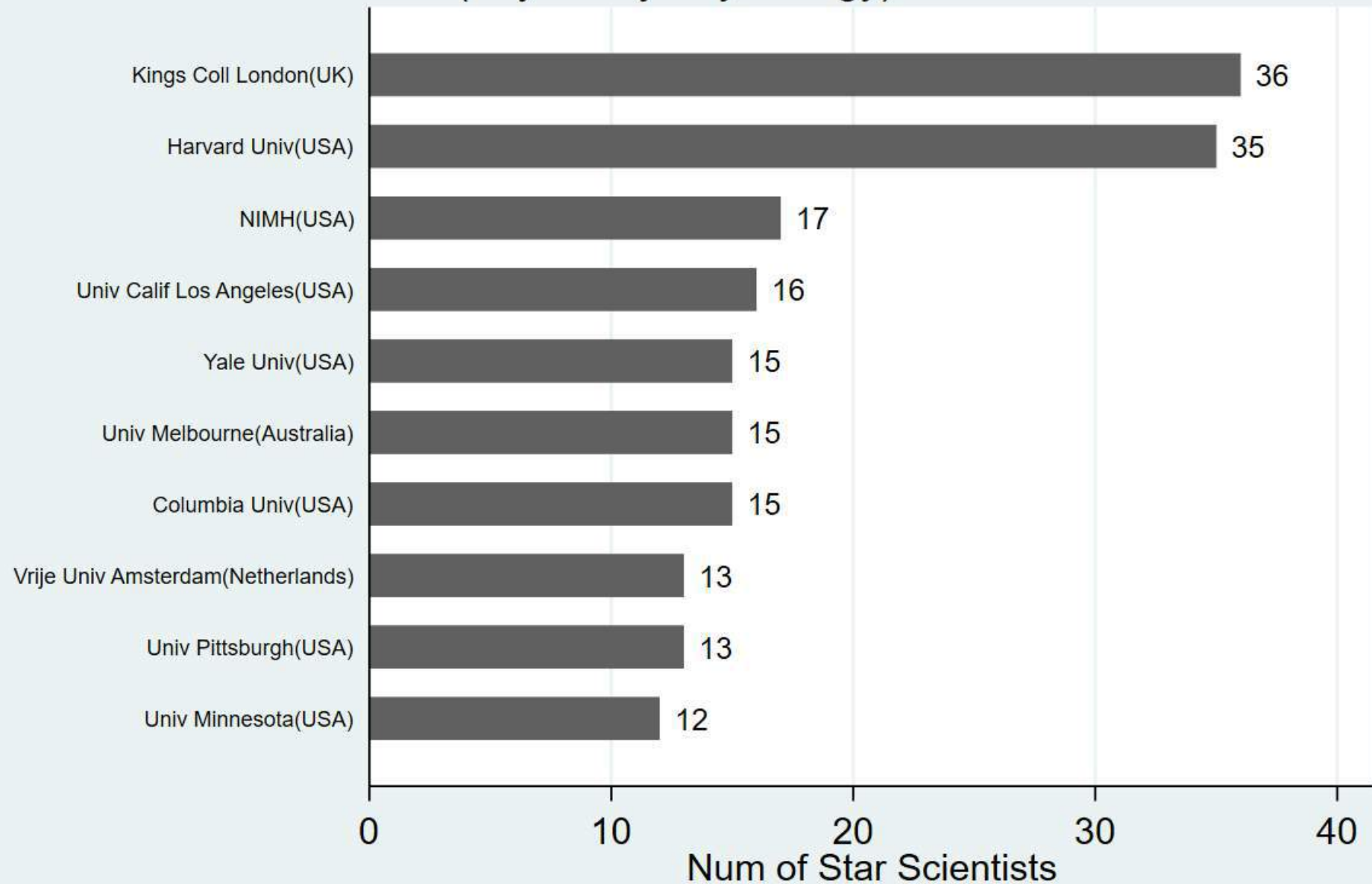
Ranking of Organizations by Num of Star Scientists(Long List) (Physics)



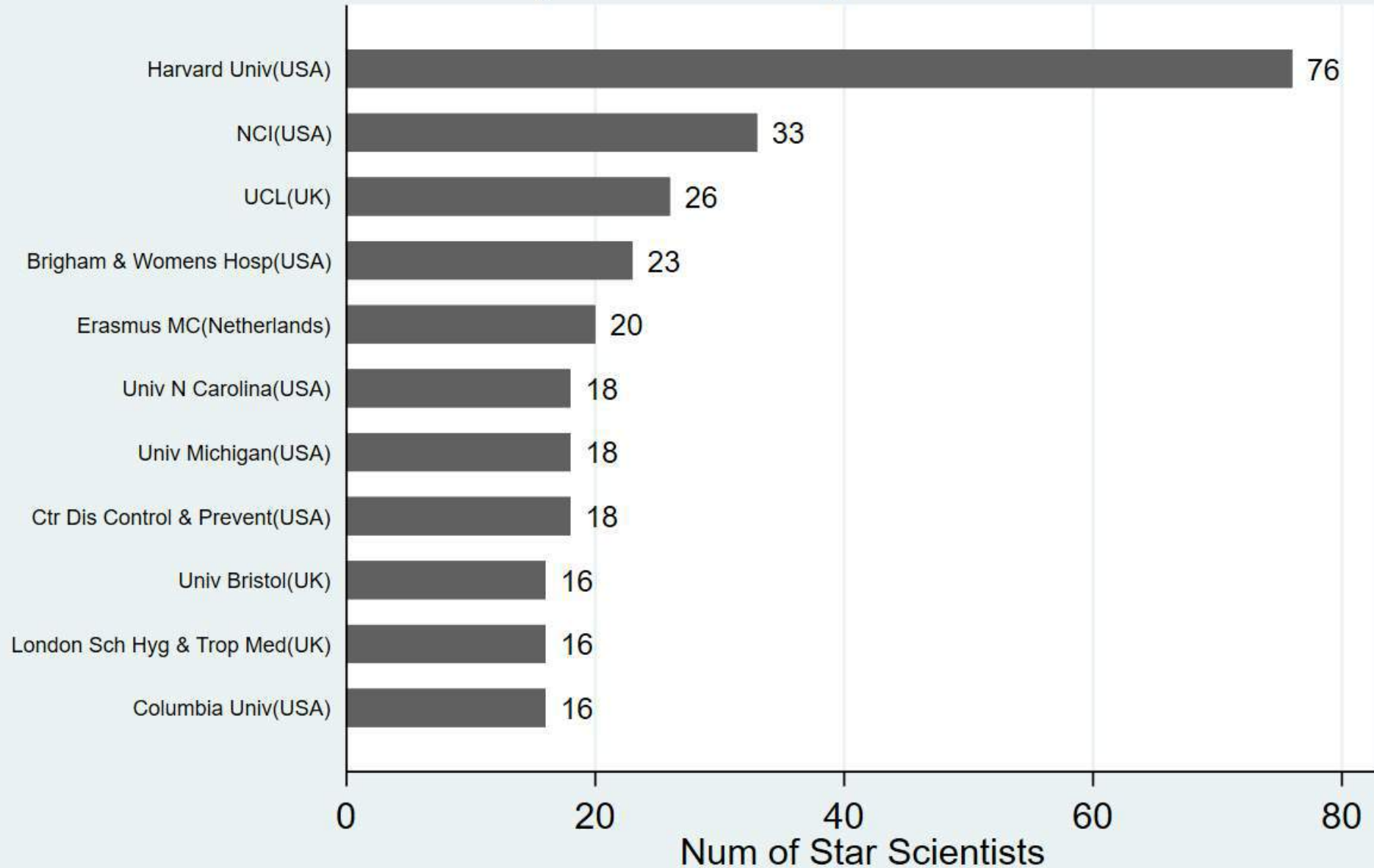
Ranking of Organizations by Num of Star Scientists(Long List) (Plant & Animal Science)



Ranking of Organizations by Num of Star Scientists(Long List) (Psychiatry/Psychology)



Ranking of Organizations by Num of Star Scientists(Long List) (Social Sciences)



Ranking of Organizations by Num of Star Scientists(Long List) (Space Science)

