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A61K 39/395 (2006.01) C07K 16/28 (2006.01)

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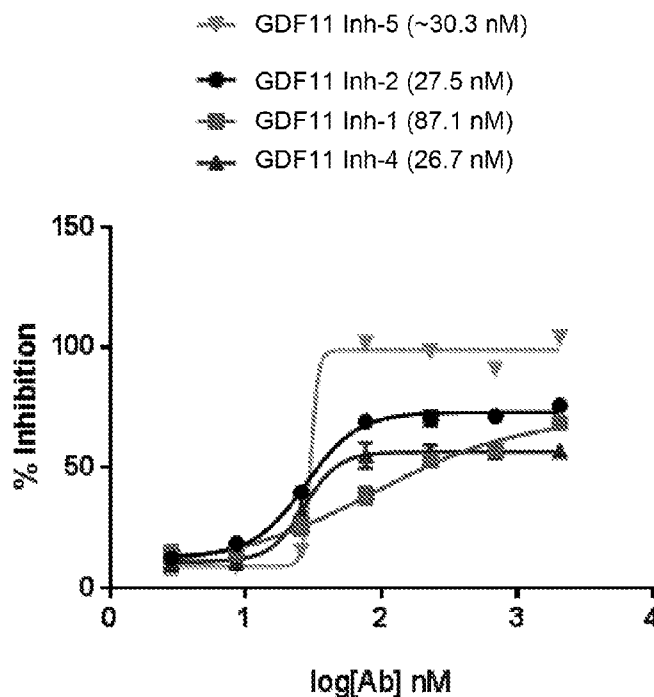
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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[Continued on next page]

(54) Title: GDF11 BINDING PROTEINS AND USES THEREOF

**FIG. 4A**

(57) Abstract: Binding proteins that specifically bind to GDF11 prodomain complex are disclosed. In some embodiments, antibodies that specifically bind to GDF11 prodomain complex are disclosed. These binding proteins may be used to treat or to prevent diseases caused by aberrant levels or activities of GDF11.



TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*
- *with sequence listing part of description (Rule 5.2(a))*

**Published:**

- *with international search report (Art. 21(3))*

**(88) Date of publication of the international search report:**

2 March 2017

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US16/43712

**Box No. I** Nucleotide and/or amino acid sequence(s) (Continuation of item 1.c of the first sheet)

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of a sequence listing:

a. ☒ forming part of the international application as filed:

☒ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).

☐ on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).

2. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

3. Additional comments:

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US16/43712

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☒ Claims Nos.: 4-15, 19-30, 34-45, 49-60, 64-75, 79-81, 83-152, 157, 159, 160, 165-173, 179, 183-203  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

\*\*\*-Please See Supplemental Page-\*\*\*

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
Claims 1-3, 76-78, 82, 153-156, 161-164, 174-178, 180-182;

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US16/43712

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61K 38/18, 39/395; C07K 16/22, 16/28 (2016.01)

CPC - A61K 38/18, 39/395; C07K 16/22, 16/28

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) Classifications: A61K 38/18, 39/395; C07K 16/22, 16/28, 16/26, 16/18; G01N 33/53 (2016.01)

CPC Classifications: A61K 38/18, 38/1841, 39/395; C07K 16/22, 16/28, 16/26, 16/18, 16/2863; G01N 33/53

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatSeer (US, EP, WO, JP, DE, GB, CN, FR, KR, ES, AU, IN, CA, INPADOC Data); Google; Google Scholar; PubMed; EBSCO; antibod\*, GDF11\*, GDF-11\*, growth\*, different\*, factor\*, 11, BMP11\*, BMP-11\*, bon\*, morphogen\*, protein\*, GDF8\*, GDF-8\*, myostatin\*, MSTN, MSLHP, latent\*, human\*, murin\*, proGDF\*, prodomain\*, proteolyt\*, cleav\*, convertas\*, tolloid\*, proteas\*, bind\*, 'Scholar Rock'

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                                                                                                                              | Relevant to claim No.                                                                                       |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| X         | WO 2014/182676 A2 (SCHOLAR ROCK, INC.) 13 November 2014; tables 1, 3, 8; paragraphs [0007]-[0009], [0011], [0035], [0037], [0049], [0064], [0068]-[0069], [00122], [00126]-[00128], [00147], [00157], [00202], [00585]-[00586]. | 1-2, 3/1-2, 153-155, 156/154-155, 161-162, 174-175, 176/174-175, 177/176/174-175, 178, 180-181, 182/180-181 |
| X         | WO 2004/009776 A2 (ABBOTT LABORATORIES S.A.) 29 January 2004; page 20, lines 5-19.                                                                                                                                              | 76-77, 78/76-77                                                                                             |
| A         | WO 2005/103081 A2 (GENMAB A/S) 3 November 2005; page 2, lines 5-6, 9-20; claim 2.                                                                                                                                               | 82                                                                                                          |
| A         | US 2013/0216548 A1 (NEIJSEN, JJ et al.) 22 August 2016; [0097]-[0098], [0218], [0242].                                                                                                                                          | 82                                                                                                          |
| A         | WO 2009/038760 A2 (AMGEN INC.) 26 March 2009; paragraphs [0022], [0025]; claim 1.                                                                                                                                               | 82                                                                                                          |
| A         | WO 2013/165972 A2 (CELL SIGNALING TECHNOLOGY, INC.) 7 November 2013; page 1, lines 14-15; page 2, lines 8-11.                                                                                                                   | 82                                                                                                          |
| A         | WO 2013/071056 A2 (DUKE UNIVERSITY) 16 May 2013; paragraphs [0006] [00028]-[00033]; figure 6.                                                                                                                                   | 82                                                                                                          |
| A         | WO 2013/148284 A1 (GENETECH, INC., et al.) 3 October 2013; abstract; page 1, line 12.                                                                                                                                           | 163/161-162, 164/163/161-162                                                                                |

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

14 December 2016 (14.12.2016)

Date of mailing of the international search report

13 JAN 2017

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US16/43712

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages.                                        | Relevant to claim No.                                                                                                                                                                |
|-----------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A         | US 2010/0221777 A1 (CHOE, et al.) 2 September 2010; paragraphs [0062], [0065], [0093], [0130].                             | 163/161-162,<br>164/163/161-162                                                                                                                                                      |
| A         | WO 1996/01845 A2 (THE JOHN HOPKINS UNIVERSITY SCHOOL OF MEDICINE) 25 January 1996; page 14, lines 18-20; page 27, line 20. | 163/161-162,<br>164/163/161-162                                                                                                                                                      |
| P, X      | WO 2016/073879 A2 (SCHOLAR ROCK, INC.) 12 May 2016; entire document                                                        | 1-2, 3/1-2, 76-77,<br>78/76-77, 82, 153-155,<br>156/154-155, 161-162,<br>163/161-162,<br>164/163/161-162,<br>174-175, 176/174-175,<br>177/176/174-175, 178,<br>180, 181, 182/180-181 |

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

PCT/US16/43712

\*\*\*Continued from Box No. III Observations where unity of invention is lacking\*\*\*

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Groups I+, Claims 1-3, 76-78, 82, 153-156, 161-164, 174-178, 180-182 and SEQ ID NOs: 64, 22, 23, 24, 25, 26, 27 and 151 are directed toward an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, and murine latent GDF11, but does not specifically bind to human proGDF11 ARM8, human proGDF8, human prodomain GDF11 ARM8, or mature GDF11; and a method of modulating growth factor activity therewith.

The antibody and method will be searched to the extent the antibody encompasses a CDR sequence encompassing the first option at each position of SEQ ID NO: 64 (i.e. DYAMH, having the same sequence as SEQ ID NO: 22)(first exemplary CDR sequence); a CDR-H1 encompassing SEQ ID NO: 22 (first exemplary CDRH1); a CDR-H2 encompassing SEQ ID NO: 23 (first exemplary CDRH2); a CDR-H3 encompassing SEQ ID NO: 24 (first exemplary CDRH3); a CDR-L1 encompassing SEQ ID NO: 25 (first exemplary CDRL1); a CDR-L2 encompassing SEQ ID NO: 26 (first exemplary CDRL2); a CDR-L3 encompassing SEQ ID NO: 27 (first exemplary CDRL3) and a cleavage site encompassing SEQ ID NO: 151 (first exemplary cleavage site). Applicant is invited to elect additional CDR(s) with a specified SEQ ID NO: that defines a fully specified sequence (i.e. no optional or variable residues) for each CDR or specified residue(s) at specified site(s) of a SEQ ID NO: to be searched. Additional CDR sequence(s) will be searched upon the payment of additional fees. It is believed that claims 1-3, 76 (in-part), 77 (in-part), 78 (in-part), 82 (in-part), 153-156, 161-163, 164 (in-part), 174-178 and 180-182 encompass this first named invention and thus these claims will be searched without fee to the extent that they encompass SEQ ID NO: 64 (limited to: DYAMH, having the same sequence as SEQ ID NO: 22)(CDR sequence); SEQ ID NO: 22 (CDRH1); SEQ ID NO: 23 (CDRH2); SEQ ID NO: 24 (CDRH3); SEQ ID NO: 25 (CDRL1); SEQ ID NO: 26 (CDRL2); SEQ ID NO: 27 (CDRL3) and SEQ ID NO: 151 (cleavage site). Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched/examined. An exemplary election would be a CDR-H1 encompassing SEQ ID NO: 28 (first exemplary elected CDRH1).

Group II, Claims 16-18 are directed toward an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, human proGDF8, and human prodomain GDF11 ARM8, but does not specifically bind to human proGDF11 ARM8, or mature GDF11.

Group III, Claims 31-33 are directed toward an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, human proGDF8, human prodomain GDF11 ARM8, human proGDF11 ARM8, and mature GDF11.

Group IV, Claims 46-48 are directed toward an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, human proGDF8, human prodomain GDF11 ARM8, and human proGDF11 ARM8, but does not specifically bind to mature GDF11.

Group V, Claims 61-63 are directed toward an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, and mature GDF11, but does not specifically bind to human proGDF11 ARM8, human proGDF8, or human prodomain GDF11 ARM8.

\*\*\*Continued Within the Next Supplemental Box\*\*\*

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US16/43712

-\*\*\*-Continued from Previous Supplemental Box-\*\*\*-

The inventions listed as Groups I+ and II-V do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical features of Groups I+ include SEQ ID NO: 22, not present in any other Group; the special technical features of Group II include an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, human proGDF8, and human prodomain GDF11 ARM8, but does not specifically bind to human proGDF11 ARM8, or mature GDF11, not present in any other Group; the special technical features of Group III include an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, human proGDF8, human prodomain GDF11 ARM8, human proGDF11 ARM8, and mature GDF11, not present in any other Group; the special technical features of Group IV include an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, human proGDF8, human prodomain GDF11 ARM8, and human proGDF11 ARM8, but does not specifically bind to mature GDF11, not present in any other Group; the special technical features of Group V include an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, murine latent GDF11, and mature GDF11, but does not specifically bind to human proGDF11 ARM8, human proGDF8, or human prodomain GDF11 ARM8, not present in any other Group.

No technical features are shared between the antibody CDR sequences of Groups I+ and, accordingly, these groups lack unity a priori. No technical features are shared between the cleavage site sequences of Groups I+ and, accordingly, these groups lack unity a priori.

Groups I+ and II-V share the technical features including: an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11 and murine latent GDF11; wherein the human proGDF11 and human latent GDF11 have SEQ ID NO: 82; wherein the murine proGDF11 and murine latent GDF11 have SEQ ID NO: 97. Groups I+, II, III and V share the technical features including: an antibody that does not bind human proGDF11 ARM8. Groups I+, II and IV share the technical features including an antibody that does not bind to mature GDF11. Groups I+ and V share the technical features including an antibody that does not bind to human proGDF8 and human prodomain GDF11 ARM8. Groups II-IV share the technical features including: an antibody that specifically binds human prodomain GDF11 ARM8 and human proGDF8. Groups III and IV share the technical features including: an antibody that binds human proGDF11 ARM8. Groups II and V share the technical features including an antibody that binds mature GDF11. Groups I+ share the technical features including: an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, and murine latent GDF11, but does not specifically bind to human proGDF11 ARM8, human proGDF8, human prodomain GDF11 ARM8, or mature GDF11; an antibody comprising an antigen binding domain, said antigen binding domain comprising six CDRs: CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3; an antibody that specifically binds to a GDF11 prodomain complex and inhibits the release of mature GDF11 from the GDF11 prodomain complex; an antibody that specifically binds to a GDF11 prodomain complex and inhibits proteolytic cleavage of a proGDF11 or a latent GDF11 by a proprotein convertase or a tollid protease; a method of modulating growth factor activity in a subject comprising delivering an inhibitor of GDF11 proteolytic activation to the subject; and an antibody that specifically binds to human proGDF11. (SEQ ID NO: 82)

However, these shared technical features are previously disclosed by WO 2014/182676 A2 to Scholar Rock Inc. (hereinafter 'Scholar').

Scholar discloses an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11 and murine latent GDF11; wherein the human proGDF11 and human latent GDF11 have SEQ ID NO: 82 (wherein human proGDF11 has SEQ ID NO: 4 (SEQ ID NO: 82); Table 1, SEQ ID NO: 4; wherein SEQ ID NO: 4 is 100% identical to Applicants' SEQ ID NO: 82); wherein the murine proGDF11 and murine latent GDF11 have SEQ ID NO: 97 (wherein the murine proGDF11 and murine latent GDF11 have SEQ ID NO: 137 (SEQ ID NO: 97); Table 8; SEQ ID NO: 137; wherein SEQ ID NO: 137 is 100% identical to Applicants' SEQ ID NO: 97); an antibody comprising an antigen binding domain (an antibody comprising a hypervariable region (an antigen binding domain); paragraph [00168]), said antigen binding domain comprising six CDRs: CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3 (the antibodies comprising light and heavy chains each having CDRs (said antigen binding domain comprising six CDRs: CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2, and CDR-L3); paragraphs [00168], [00179]); an antibody that specifically binds to a GDF11 prodomain complex (an antibody that specifically binds to a GDF11 prodomain complex; Table 1, paragraph [00128]) and inhibits the release of mature GDF11 from the GDF11 prodomain complex (and inhibits the release of mature GDF11 from the GDF11 prodomain complex; Table 1, paragraph [00127]); an antibody that specifically binds to a GDF11 prodomain complex (an antibody that specifically binds to a GDF11 prodomain complex; Table 1, paragraph [00128]) and inhibits proteolytic cleavage of a proGDF11 or a latent GDF11 by a proprotein convertase or a tollid protease (and inhibits proteolytic cleavage of a proGDF11 or a latent GDF11 by a proprotein convertase or a tollid protease; Table 1, paragraph [00147]); a method of modulating growth factor activity in a subject (a method of modulating growth factor activity in a subject; paragraphs [0011], [0064]) comprising delivering an inhibitor of GDF11 proteolytic activation to the subject (comprising delivering an inhibitor of GDF11 proteolytic activation to the subject; paragraph [0064], Table 1; paragraph [00202]); and an antibody that specifically binds to human proGDF11 (an antibody that specifically binds to proGDF-11; paragraphs [00585], [00586]). Scholar further discloses chimeras including GDF-8 and GDF-11 sequences that correspond to proGDF11 ARM8 (a chimera comprising GDF-8 and GDF-11 sequences comprising SEQ ID NO: 208 (proGDF11 ARM8); Table 13; SEQ ID NO: 208, wherein SEQ ID NO: 208 is 100% identical to Applicants' SEQ ID NO: 122 (see paragraph [0021] of the instant specification for identity of proGDF11 ARM8 as SEQ ID NO: 122)), and prodomain GDF11 ARM8 (SEQ ID NO: 210 (prodomain GDF11 ARM8); Table 13, SEQ ID NO: 210, wherein SEQ ID NO: 210 is 100% identical to Applicants' SEQ ID NO: 124 (see paragraph [0021] of the instant specification for identity of prodomain GDF11 ARM8 as SEQ ID NO: 124)); antibodies that bind thereto (and antibodies that bind thereto; paragraphs [0007], [0009]); as well as antibodies that bind to murine proGDF11 (antibodies that bind to murine proGDF11; paragraphs [0007], [0009], Table 8), human latent GDF11 (human latent GDF11; paragraphs [0007], [0009], Table 1, paragraph [00122]) and murine latent GDF11 (murine latent GDF11; paragraphs [0007], [0009], Table 8, paragraph [00122]); mature GDF11 (mature GDF11; paragraphs [0007], [0009], [00101]); and human proGDF8 (human proGDF8; paragraph [00585]); and the selection of antibodies that bind to one or more of human and/or murine GDF8 or GDF11 molecules or prodomains (selection of antibodies that bind to one or more of human and/or murine GDF8 or GDF11 molecules or prodomains; paragraphs [00585], [00586]).

-\*\*\*-Continued Within the Next Supplemental Box-\*\*\*-

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US16/43712

-\*\*\*-Continued from Previous Supplemental Box-\*\*\*-

Scholar does not disclose an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11 and murine latent GDF11; an antibody that does not bind human proGDF11 ARM8; an antibody that does not bind to mature GDF11; an antibody that does not bind to human proGDF8 and human prodomain GDF11 ARM8; an antibody that specifically binds human prodomain GDF11 ARM8 and human proGDF8; an antibody that binds human proGDF11 ARM8; an antibody that binds mature GDF11; an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, and murine latent GDF11, but does not specifically bind to human proGDF11 ARM8, human proGDF8, human prodomain GDF11 ARM8, or mature GDF11. However, it would have been obvious to a person of ordinary skill in the art at the time of the invention was made to have included the chimeras comprising portions of the GDF8 and/or GDF11 molecules, including prodomains thereof, as disclosed by Scholar, in the antibody selection process disclosed by Scholar, wherein the identification of antibodies that bind or do not bind to one or more specific proteins or protein domains, including any of human proGDF11, murine proGDF11, human latent GDF11, and murine latent GDF11, human proGDF11 ARM8, human proGDF8, human prodomain GDF11 ARM8, and mature GDF11, such as an antibody that does not bind human proGDF11 ARM8; an antibody that does not bind to mature GDF11; an antibody that does not bind to human proGDF8 and human prodomain GDF11 ARM8; an antibody that specifically binds human prodomain GDF11 ARM8 and human proGDF8; an antibody that binds human proGDF11 ARM8; an antibody that binds mature GDF11; an antibody that specifically binds to human proGDF11, murine proGDF11, human latent GDF11, and murine latent GDF11, but does not specifically bind to human proGDF11 ARM8, human proGDF8, human prodomain GDF11 ARM8, or mature GDF11, would have been desirable in order to identify and separate antibodies potentially useful for administration to a subject for laboratory testing to identify antibodies useful for the treatment of a GDF-associated disorder by modulating growth factor activity, as disclosed by Scholar, as well as antibodies useful in humans for said treatment.

Since none of the special technical features of the Groups I+ and II-V inventions is found in more than one of the inventions, and since all of the shared technical features are previously disclosed by the Scholar reference, unity of invention is lacking.